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An Empirical Investigation of the Interface Between Internal and External Auditors

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Abstract—Professional standards place specific responsibilities on auditors for the discovery of material mis-statements in reports of corporate financial performance. Certain factors have been shown to increase the likelihood of fraudulent financial reporting. One warning sign is the potentially pervasive effect of a weak internal control environment consistent with a weak internal audit group. This study investigates the impact of internal audit department quality differences on auditors' willingness to place reliance on the work performed by internal auditors. The study also gives consideration to auditors' recent experiences with material errors and irregularities and examines the influence of two previously untested individual auditor differences on audit judgment decisions: (1) conflict management style and (2) perception of internal/external auditor communication barriers. The results indicate that auditors attend to internal audit department quality differences and that individual auditor differences exhibit significant influence over auditor judgments. Implications for audit practice are considered and directions for future research are suggested.

1. Introduction

Auditors play a crucial role in the financial reporting process by attesting to the fair presentation of a company's financial statements. Although professional standards do not specifically state that auditors have a duty to detect management fraud, Statement on Auditing Standards (SAS) No. 53, *The Auditor's Responsibility to Detect and Report Errors and Irregularities* (AICPA, 1988), requires that auditors plan their examination to search for errors or irregularities *that would have a material effect* on the financial statements.[1] When auditors determine that there is a significant risk that material mis-statements could occur, the audit plan should reflect an increased level of professional skepticism. In general, under these conditions, the auditor will demand more competent evidence or a greater amount of evidence, or a combination of both.

For many years, a gap has arguably existed between the assurances auditors provide (on client-prepared financial information) and the expectations of investors, creditors, and other financial statement users. These differences have been termed the 'expectation gap'. Highly publicised events involving fraudulent financial reporting have focused public attention on the corporate financial reporting process. In response, policy makers have attempted to improve that process. During the period between February 1985 and January 1987, nine statements of financial accounting standards intended to enhance the quality of GAAP were issued by the FASB, and 11 financial reporting releases and 10 staff accounting bulletins were issued by the SEC.

Congress formed the National Commission on Fraudulent Financial Reporting (NCFFR) and the Public Oversight Board of the SEC Practice Section of the AICPA was formed. These groups were established, in part, to identify causal factors which can lead to fraudulent financial reporting and to make recommendations to reduce the incidence of fraudulent financial reporting, and/or enhance its detection.

Despite changes in practice and standards, however, auditors remain likely targets for lawsuits from financial statements users if fraud goes undetected or is detected but not reported (Persons, 1995). The impact of a lawsuit on the financial condition and reputation of an auditing firm can be devastating.

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[1] In February 1997, the Auditing Standards Board (ASB) issued Statement on Auditing Standards (SAS) No. 82, 'Consideration of Fraud in a Financial Statement Audit'. The new standard, which supersedes SAS No. 53, is effective for financial statement audits for periods ending on or after December 15, 1997. The ASB issued SAS No. 82 to provide expanded operational guidance on the consideration of fraud in a financial statement audit. The ASB considers the detection responsibility to be the same under the new and old standard and the present paper, completed while SAS No. 53 was in effect, is not directly affected by the new standard.

2. Detecting fraudulent financial reporting

SAS No. 53 places specific responsibility on the auditor for the discovery of *material* mis-statements in corporate financial reports. It also identifies certain factors (often referred to as red flags) that are likely to increase the incidence of fraudulent financial reporting and 'enjoins the auditor under such conditions of increased inherent risk to exercise more circumspect judgment' (Reckers and Schultz, 1993: 126).

Thus, auditors should exhibit an increased level of professional skepticism when evidence suggests a higher risk of fraud. Early in the planning stage of an audit, auditors must look for circumstances or combinations of circumstances that make fraudulent reporting more likely (Finney, Malone, and Cooper, 1994). When such situations are found to exist, the auditor is required to design the audit program to detect possible material mis-statements.

There are costs associated with extended audits (conducted in the presence of significant red flags). Planning an extended audit when fraud does not exist reduces audit efficiency and results in over-auditing. This suggests that 'it may not be in the audit firm's best interest that the professionals "over-react" to certain red flags, as they are merely indicative of potential problems' (Krull, Reckers, and Wong-On-Wing, 1993: 147).[2]

3. External/internal auditor interface

One important red flag is the potentially pervasive effect of a weak internal control environment represented by a weak internal audit group. The degree to which the external auditor should rely on the work of internal audit professionals is a highly contentious issue in the profession (Colbert, 1993; Peacock and Pelfrey, 1989; Ward and Robertson, 1980). While there is limited data to support the position that there are numerous benefits provided by an internal audit department (Wallace and Kreutzfeldt, 1991), many commentators argue that both the effectiveness as well as the efficiency of an audit depends upon the presence of a strong internal group and the mutual respect of internal and external auditors.

Nonetheless, Mautz (1985) determined that internal auditors viewed their interactions with external auditors as the least appealing part of their job, and directors of internal audit departments ranked this relationship as least appealing. Peacock and Pelfrey (1989) found that staff internal auditors who worked with external auditors felt

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[2] The threat of competitive pressures make both types of errors (over-auditing and under-auditing) very costly. Krull et al. (1993) suggest that auditors must be sensitive to both society's and clients' rights and needs.

that external auditors did not fully utilise the internal auditors' expertise. These negative attitudes can affect both the efficiency and effectiveness of the independent audit by limiting the external auditor's willingness to work with internal auditors.

One of the goals of SAS No. 65. *The Auditor's Consideration of the Internal Audit Function in an Audit of Financial Statements* (AICPA, 1991) was to provide additional guidance to the independent auditors when considering the work performed by internal auditors and when using them to provide direct assistance with the audit of an entity's financial statements. While many internal auditors view the new statement as a major advancement in the relationship of external and internal auditors, this belief is not universally accepted (Schueler, 1992). Some internal auditors believe that SAS No. 65 falls short of its goals and argue that it 'misinterprets critical aspects of the internal auditing process and omits any guidance with regard to how the external auditor should use or rely on relevant internal audit work (Barrett, 1990: 31). An additional concern is that the statement does not strengthen the relationship between external and internal auditors and, thus, will not provide the internal auditors with the peer recognition they desire.

It should be noted that in a report co-authored by the AICPA and the Canadian Institute of Chartered Accountants (AICPA and CICA, 1989), an attempt was made to provide guidance to independent auditors. Although this report was published prior to the current study, the participants were not asked if they were aware of the existence of this report and there is no definitive way of knowing what guidance they considered, if any.

However, in discussions with the professionals serving as subjects and in pre-experiment discussions with professionals of this firm and other firms, the predominant opinion was that operationally specific guidance was lacking. Finally, whatever guidance was accessed by subjects participating in this study, it is apparent that certain questions persist.

In addition to these issues, it is important to recognise that the job of the standard setters is not without complications. The writers of authoritative standards are faced with a difficult task in that the language they use is often subject to interpretation and controversy. Whereas clients want reliance language, accounting firm lawyers want more defensible language, such as consideration. Operationally, we interpret the authoritative language in a fashion consonant with clients, i.e. reliance. Nonetheless, we acknowledge that existing literature will likely continue to be controversial (as one journal reviewer pointed out during the review process).

Despite the criticisms, it is clear that SAS No. 65 does provide opportunities for the external au-

ditors to place increased reliance on the work of the internal auditors. The amount of reliance is to be based on the *competence* (knowledge of the company's and the internal audit department's operations, processes, and procedures and the quantity and quality of supervision) and *objectivity* (level to which the internal audit department reports) of the internal auditors and also on the *quality and effectiveness of the work performed* (percentage of audits performed with an adequate scope and the amount of time spent on duties that conflict with the internal audit role) by the internal auditor.

It is not apparent whether external auditors are taking advantage of these opportunities, and the concerns of the critics have yet to be addressed. As a result, it is important to investigate if external auditors are sensitive to quality differences across clients' internal audit groups and place greater reliance on work and assurances of higher quality internal audit departments.

This leads to our first empirical question and hypothesis: Auditors will place greater reliance on the work and assurances of strong internal audit departments. (H1)

4. Individual auditor differences

Differences in audit judgments, across auditors, may relate to environmental conditions or to the auditor. Specifically, we examine the influence across auditors of different, recent experiences with material errors or irregularities; different management styles for dealing with client conflict; and different perceptions as to the severity of internal/external auditor communication barriers.

4.1. Recent experience

As discussed above, SAS No. 53 requires auditors to 'assess the risk that errors and irregularities may cause the financial statements to contain a material mis-statement'. An irregularity would be an indication of management fraud. Unexpected changes (across time) in key financial ratios, however, may also be the result of an environmental change (including normal year to year variation). A fundamental difference between an error or irregularity and an environmental change is that an error or irregularity necessitates an adjustment to correct the mis-stated account balance in the financial statements.

Another inherent dissimilarity among errors, irregularities and environmental changes relates to the frequency of occurrence. Although the incidence of errors and irregularities is difficult to quantify, the occurrence of serious fraudulent financial reporting is thought to be an infrequent event (e.g. Joyce and Biddle, 1981; NCFFR, 1987; Wright and Ashton, 1989). Archival studies (e.g.

Hylas and Ashton, 1982; Kreutzfeldt and Wallace, 1986) have reported that most errors can be classified as judgment errors or incorrect application of GAAP and, thus, are not intentional or fraudulent in nature. Subsequent behavioural studies show that auditors perceive fundamental differences in the likelihood of error, irregularity and environmental change explanations (Ashton, 1991; Kaplan, Moeckel and Williams, 1992).

Environmental explanations were ranked as more explanatory among highly experienced professionals (audit managers; Kaplan et al., 1992) and the cause of unexpected differences can more often be attributed to environmental changes (Ashton, 1991). Fraud and financial statement errors are thought to be rare events.

Many prior studies have examined auditors' error-frequency knowledge (e.g. Butt, 1988; Libby and Frederick, 1990; Nelson, 1993). Libby (1985) and Libby and Frederick (1990) found that auditors' experience with errors and irregularities leads them to learn frequency information with regard to errors and irregularities. As they gain experience, their perception of the frequency of the occurrence of error and irregularity causes becomes more accurate. Butt (1988) reports that auditors learned most accurately from direct experience. Among young auditors, direct experience may be limited. Availability theory suggests that recently experienced events, furthermore, are the events most easily called to mind (retrieved from memory) and thus may most influence judgments.

In view of this research, it follows that among new audit seniors, the greater the number of engagements on which they have served as seniors in the recent past (12 months) that have been free of material errors or irregularities, the lower the likelihood that they will attribute unexpected account or ratio changes to an error or irregularity cause, and conversely, the more errors experienced the higher the attribution likelihood.

This discussion leads to the following hypothesis: Auditors who have seniored more audit engagements in the last 12 months without material error/irregularity will be less likely to attribute an unexplained variance to an error/irregularity cause as opposed to an enviroment cause. (H2)

4.2. Conflict management style

Based upon an assessment of the risk of material misstatement, the auditor must design the audit plan. If elevated risks are perceived, the standard audit plan may need to be modified. Analytical procedures are intended to contribute to risk assessments at the audit planning stage. However, one of the most pervasive types of audit evidence is information obtained through inquiry of management (Koonce, 1992). Studies have found (e.g. Hylas and Ashton, 1982; Kruetzfeldt and

Wallace, 1986) that a large proportion of financial statement errors are initially signaled by analytical review (now called analytical procedures) and discussions with the client.

Further, in some situations management is the only reasonable source for answers to unexpected fluctuations during analytical procedures or for certain accounting estimates made (Anderson, Koonce and Marchant, 1994). In instances such as these where significant judgment is required, individual differences among professionals may have a great influence over the decisions made. Arguably, certain auditors may more readily defer to management's explanations simply to avoid conflict.

Two individual differences that we hypothesise are relevant to audit planning are conflict management style (of the auditor) and previously experienced communication barriers existing between the auditor and client.

Although conflict is a widespread phenomenon existing in many areas of human interaction and organisational life (Ting-Toomey, 1986; Wilson and Waltman, 1988), it is not clear whether conflict produces positive or negative consequences for an organisation and its members. While some research indicates that conflict can produce beneficial results (e.g., make decision-makers more receptive to new information, increase the range of alternatives considered), other research observes how conflict can be harmful (see Putnam and Wilson, 1982 or Schwenk, 1990 for a review of these studies). The result of conflict, in the end, will often depend on the method of conflict management adopted by the individuals involved (Schwenk, 1990; Ting-Toomey, 1986).

Individuals who perceive conflict as harmful are likely to avoid it (Schweiger, Sandberg and Ragan, 1986) or view it with suspicion. They will encourage consensus and suppress disagreements (Bourgeois, 1985; Janis and Mann, 1977). Others may view conflict as unpleasant but productive and constructive (Nemeth, 1986; Tjosvold, 1985). Although the results in this area are mixed, it is clear that the outcome of a conflict situation will be influenced by the decision-makers' conflict management style.

Auditors are frequently put in situations where conflicts arise. For example, when a client provides the auditor with an explanation for a significant difference between two years' ratios, the auditor must decide if the information is reliable and whether is constitutes 'sufficient competent evidential matter' (GAAS). If it is deemed to be so, conflict is suppressed and no further testing is required. However, if it is considered to be incomplete or unreliable, additional testing will be necessary at the risk of open and aggravated conflict with the client. As suggested by the conflict

management style literature, individuals will respond differently to the same situation.

This discussion leads to the following hypothesis: External auditor reliance on the work and assurances of internal auditors and, thus, auditor decisions to extend or not extend standard audit procedures, will be influenced by the management operating styles of the external auditor. (H3)

As will be discussed in the methods section, greater reliance will be operationalised as reduced assessments of the need for extended audit procedures are made.

4.3. Communication barriers

Poor communication is the most frequently cited source of interpersonal conflict in an organisation, and communication barriers serve both as an antecedent to conflict and an impediment to remedy (Robbins, 1974). Tjosvold (1982) stated that if the dynamics of the relationship and the outcomes of interactions are examined in a conflict situation, better decisions and improved relations may occur. Prior research (e.g. O'Reilly and Roberts, 1977; Zand, 1972) has linked effective communication with decision-making performance and group effectiveness. However, as indicated by Golen, Gupta and O'Dell (1995), prior research has tended to focus on non-accountants and the results may not generalise to the various relationships involving auditors because communication barriers are known to vary by the type of relationship and the setting.

Communication has been recognised as a crucial component of an effective control environment (COSO, 1992) and good communication is likely to deter fraud as it fosters openness (Hooks, Kaplan and Schultz, 1994). More specifically, communication barriers between external auditors and internal auditors can have a significant impact on the efficiency of an audit. Whittington (1989) noted that effective communication reduces the overlap of audit efforts, but that it requires joint planning, open lines of communication, and a consideration of various aspects of human relations. It has also been observed that better communication between external and internal auditors can increase the detection of employee fraud (Calderon and Green, 1994).

Since the evidence-gathering phase of the audit involves ongoing communication with the client (and, specifically, the internal auditors), perceived severity of communication barriers will likely have an impact on how much interaction actually occurs, and the degree of external audit redundancy. If the auditors perceive significant barriers to communication, and thus interaction with the internal auditor as non-useful or inefficient, they may avoid the client and attempt to gather information using alternative procedures. Thus, negative atti-

tudes can affect both the efficiency and effectiveness of the independent audit by limiting the external auditor's willingness to work with internal auditors. As a result, it is important to investigate how severe external auditors perceive communication barriers to be and whether these perceptions affect the evidence-gathering process.

This discussion leads to the following hypothesis: The number of external audit staff hours needed to gather additional evidence will be influenced by previously experienced or perceived communication barriers (such that greater perceived barriers will lead to less efficiency, i.e. planned scheduling of more external audit staff hours). (H4)

5. Research method

Subjects

The subjects consisted of 107 audit seniors from one Big Six firm attending a training seminar. All participants volunteered for the experiement and completed the task individually. Subjects were randomly assigned to one of three conditions: a case scenario including a weak internal audit department (weak), a strong internal audit department (strong), or a control condition which was silent regarding the internal audit department of the client (control, implicit strength: medium). Table 1 provides additional descriptive information about the subjects.[3]

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[3] Subjects reported similar formal education (four-year undergraduate degree), similar continuing education (provided by their firm), and similar experience levels (in amount and type). The average size of the client internal audit department was six. When partitioning the subjects on this dimension (experience with average internal audit departments of less than six individuals versus experience with average internal audit departments of greater than six individuals) no significant main or interaction effects were found. Further, neither gender differences nor age differences yielded significant findings. Thus, the group of subjects exhibit relatively high homogeneity.

Task and case materials

Three cases were developed. The cases dealt with analytical procedures conducted during preliminary audit planning. Subjects played the role of an external audit senior. They were provided with an unaudited income statement and balance sheet for the current year and inventory turnover ratios for the current and prior year (reflecting a significant difference between the two years' ratios). This is an area that would commonly be handled by auditors with approximately three years of experience, which is consistent with the experience of our participants.

In two case scenarios, subjects were given informaticn relative to the strength of the client's internal audit function, which would allow a strong versus weak attribution. The third case was a control case and no information about an internal audit department was provided; a moderate attribution was expected. The manipulations of the strength and weakness of the internal audit functions of *objectivity*, *competence*, and *work performance* were based on descriptions of the internal audit function developed by Schneider (1984, 1985) as well as the standard (SAS No. 65) itself.

The new standard includes expanded and revised guidelines for the external auditor when evaluating the relevance of the internal audit function and the extent to which the internal auditors' work may affect the procedures performed by the external auditor (McDuffie and Brown, 1993). In one case, the internal audit staff were consistently weak (in all three regards), while in the other they were strong (also in all three regards).

Internal audit objectivity. This variable was manipulated by changing the organisational level to which the internal audit department reported. In the weak manipulation the internal auditors reported to the assistant controller, while in the strong manipulation they reported to the audit committee chairperson.

Internal auditor competence. This variable was also manipulated at two levels. In the weak con-

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Table 1
Demographic information of participating auditors

Variable	Mean	Standard deviation
Years of audit experience	3.27	1.72
Number of audit engagements in the past year	7.56	5.31
Average size of the internal audit department during audit engagements	6.03	9.71
Percentage of males	46%	
Age:		
Percentage of 21-30 year olds	88%	
Percentage of 31-40 year olds	12%	

Exhibit 1
Explanations provided by the diagnostic decision aid
Environmental explanations:
1. Sales down due to downturn in the economy or change in credit policy.
2. Change in accounting or costing method for inventory.
3. Sales down due to technology changes.
4. Sales down due to increased turnover in the sales department, decreased sales incentives, or marketing change(s).
5. Increase in actual inventory costs; higher overtime or payroll.
6. Inventory up due to poor anticipation of needs or poor ordering practice, resulting in excess inventory.
7. Change in product mix or change in production method.
8. Sales down due to defective product(s), bad publicity, or strike(s).
9. Inventory up due to large new job(s) requiring substantial inventory over a long time; inventory up due to stockpiling to create a reserve supply of inventory.

Error explanations:
1. Error in recording labour rates.
2. Incorrect cost allocation or calculation for inventory, including error in computing average cost, non representative average cost, incorrect cost recording, misapplied or miscosted overhead, or misapplication of variances.
3. Incorrect test counts of inventory.
4. Inventory accounts not credited for sales.
5. Misclassified transactions or clerical errors in posting or extending.
6. Error in cut-off of inventory, accounts payable, COGS, or sales, including beginning inventory, improper revenue recognition, or unrecorded sales.
7. Unbooked physical adjustments to inventory, including obsolete inventory or unsalable inventory, or unrecorded shrinkage.
8. Consigned goods incorrectly included in inventory.

dition, the internal audit department was described as having only two of 16 individuals having satisfactory auditing experience, and that in the procedures examined by the external auditors, only 40% were considered to have satisfactory instruction and supervision by senior internal audit personnel. Further, the head of the department was described as a 26-year-old relative of the president of the company who had graduated from a technical institute five years ago and had been working in the corporate accounting department of the company since graduating. The prior head of internal audit resigned after 18 months as a result of a dispute with the corporate president. Conversely, the strong condition indicated that all 16 individuals in the internal audit department possessed satisfactory auditing experience and that 100% of the procedures examined provided evidence of satisfactory instruction and supervision by senior internal audit personnel.

Work performed. In the weak group, it was indicated that the internal auditors spent approximately 60% of their time on duties that conflict with the internal audit role and that only 40% of the audits are performed with an adequate scope. The strong treatment described the internal audit department as having no duties that conflict with the internal audit role and 100% of the audits performed with an adequate scope. Further, it was reported that the internal documentation (working papers) was considered to be satisfactory in both quantity and quality in 40% and 100% of the audits for the weak and strong groups, respectively.

All subjects were then provided with the results of a diagnostic decision-aid that listed nine possible environmental and eight possible error or irregularity explanations (for the material ratio changes, see Exhibit 1) and internal audit group assurances that the changes were due to environmental causes. It was expected that the degree to which the participants relied on the assurances (of the internal audit group) would depend on the manipulations of the strength of the internal audit group, and individual auditor differences (Mock, Wright, Washington and Krishnamoorthy, 1996).

After considering the information provided, the subjects were asked to determine the probability that the decrease in the inventory turnover ratio was primarily caused by environmental changes and the probability that the decrease was primarily caused by accounting errors and/or irregularities (dependent measure 1); to determine to what extent it would be necessary to further explore and verify the reasons for the inventory turnover change, i.e., extend audit procedures (dependent measure 2); and if further inquiry is necessary, to estimate how many external auditor staff hours

would need to be allocated to this task (dependent measure 3).

Dependent variables

Probability of errors and/or irregularities. Subjects were asked to indicate the probability (i.e. allocate 100 points) that the decrease in the company's turnover ratio was caused primarily by accounting errors and/or irregularities versus environmental changes. This is a critically important question that the auditor must address in planning the audit. Numerous previous studies have asked subjects to provide the likelihood of, or an estimate of error or irregularity, (e.g. Hackenbrack, 1993; Krull, Reckers, and Wong-On-Wing, 1993; Reckers and Schultz, 1993) or whether or not they believe an account is *fairly stated* (e.g. Bernardi, 1994; Kaplan and Reckers, 1995). It is expected that auditor assessments of the risk of error or fraudulent financial reporting will be influenced by the strength of the internal audit department (H1) and related recent experiences (H2).

Extended procedures. In addition to assessing the risk of error or fraudulent financial reporting, the auditor must decide whether there exists a need to expand audit tests (expand audit scope) and if so, by how much. Accordingly, subjects were asked to report the extent to which they believed it was necessary to further explore and verify the reasons for the inventory turnover change. A scale of zero to 10 was used to represent the lowest and highest perceived need, respectively. The specific question was posed as follows: 'To what extent do you believe it is necessary to further explore and verify the reasons for the inventory turnover change?'

| *Not necessary* | | | | | | | | | | *Very* |
| *at all* | | | | | | | | | | *necessary* |

0...1...2...3...4...5...6...7...8...9...10

It was anticipated that the conflict management style of the auditor, as well as the strength of the internal audit department, would influence this operational decision.

Additional hours. Also, subjects were asked to indicate, if applicable, how many additional audit staff hours they felt would need to be allocated to complete the task: If you believe further inquiry is necessary, but only if you feel so, please indicate how many audit staff hours you would allocate to this task. It was anticipated that communication barriers, as well as the strength of the internal audit department, would influence this operational variable.

Measured variables

A between-subjects design was used where each subject received only one of the three versions of the case. After completing the tasks in the case,

subjects were asked to indicate the number of engagements they seniored in the last 12 months which did not require material adjustments to financial statements and, also, to complete measures of conflict management style and communication barriers. The first item is self-explanatory; the latter two are discussed below.

Operating style. Putnam and Wilson (1982) developed the Organisational Communication Conflict Instrument (OCCI) to assess communicative tactics that individuals use in organisational situations. The OCCI assesses verbal and non-verbal tactics, and is sensitive to situational influences on conflict behaviours (Wilson and Waltman, 1988). The communicative strategies that are used when conflict arises can produce functional or dysfunctional consequences for an organisation and its members (Deutsch, 1969). The OCCI questionnaire uses seven-point Likert-type scales where 1 represents *always* and 7 represents *never*. The OCCI's consistency has been assessed in several different studies and alpha coefficients have ranged from 0.77 to 0.88 (e.g. Chua and Gudykunst, 1987; Putnam and Wilson, 1982).

We expected that prior disagreements between the participants and internal auditors might have a significant impact on responses elicited in this study. Accordingly, an instrument, adapted from Putnam and Wilson (1982), was created to determine the conflict strategy of each subject. The instrument contained 30 items or behaviours that assessed the conflict strategies used when external auditors encountered a particular task situation with an internal auditor. External auditors indicated the frequency of their engaging in each of the 30 behaviours. Factor analysis identified five distinct factors (operating styles). See Exhibit 2.

Responses to dependent questions significantly associated with only two of the conflict management styles identified: the 'avoid conflict by denial of problem significance' and the 'avoid conflict by going around the internal auditor' styles. The 'denial of problem significance' style avoids conflicts by suppressing conflict. Individuals scoring high on this style can be expected to express a low need for extended audit procedures; they accept internal auditor assurances that unusual ratio changes can be attributed to environmental explanations.

On the other hand, individuals scoring high on 'go around the internal auditor' style can be expected to emphasise their own efforts and rely little on the efforts of the internal auditor. These individuals can be expected to express a high need for extended audit procedures performed by the external audit staff.

Communication barriers. A survey instrument was used to identify potential barriers that could inhibit or impede communication between external and internal auditors during an audit by the independent public accounting firm. Subjects were

Exhibit 2
Conflict management style
Participants were given the following instructions:

> Think of disagreements you have encountered in a particular task situation with an internal auditor. Then indicate below how frequently you engage in each of the described behaviours. For each item circle the number that represents the behaviour you are *most likely* to exhibit. There are no right or wrong answers.

The following scale was provided:

1	2	3	4	5	6	7
Always	Very often	Often	Sometimes	Seldom	Very seldom	Never

Factor analysis revealed five distinct operating styles/factors. These factors, along with the most significant questions for each factor, are:

Inaction styles

Avoid conflict by denial of any problem
- I downplay the importance of a disagreement.
- I reduce disagreements by making them seem insignificant.
- I try to smooth over disagreements by making them appear unimportant.

Flexible 'work with internal auditor' styles

Avoid conflict through compromise
- I give in if the internal auditor will meet me halfway.
- I meet the internal auditor at a mid-point in our differences.

Avoid conflict through creative resolution
- I try to use the internal auditor's ideas to generate solutions to my problems.
- I blend my ideas with the internal auditor to create new alternatives for resolving a disagreement.

Inflexible 'my way' styles

Dominate
- I dominate arguments until the internal auditor understands my position.
- I assert my opinion forcefully.

Work around internal auditor
- I avoid the internal auditor when I suspect that he or she wants to discuss a disagreement.
- I shy away from topics which are sources of disputes with the internal auditor.
- I side-step disagreements when they arise.

asked to indicate the seriousness and frequency of 29 potential barriers to effective communication between external and internal auditors. This measure was adapted from the instrument developed by Golen, Looney, and White (1988). The consistency of this instrument has been assessed and alpha coefficients have ranged from 0.84 to 0.85 (e.g. Golen, Gupta, and O'Dell, 1995; Golen et al., 1988).

Auditors indicated the frequency of the 29 items based on a 4-point Likert-type scale where 1 denoted *never* and 4 denoted *often*.

Next, they indicated the seriousness of each item based on a 5-point Likert-type scale where 1 de-noted *not serious* and 5 denoted *very serious*.[4] An overall barriers score was obtained by multiplying the frequency and seriousness for each item. This score was then factor analysed and the analysis revealed one significant factor which was then used as the independent measure.

Finally, the subjects were asked to provide demographic data.

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[4] An 'other' category was also included on the questionnaire for open-ended responses to provide participants with an opportunity for any additional communication barriers they believed existed but were not included in the 29 barriers. No substantive comments were made.

Table 2
Summary ANOVA results
Dependent measure 1 - Likelihood of error

Source	DF	Sum of squares	Mean square	F	Pr > F	Regression coefficient
Strength of internal audit	2	9545.02	4772.51	12.16	0.0000	
Client error experience	1	2176.43	2176.43	5.54	0.0205	1.0157
'Work around IA style'	1	645.38	645.39	1.64	0.2028	-0.6996
'Deny problem' style	1	799.23	799.34	2.04	0.1568	-0.8986
Communication barriers	1	418.94	418.94	1.07	0.3042	0.0706
All covariates	4	830.77	830.77	2.12	0.0845	
Error	98	38475.20	392.60			

6. Results

The preceding hypotheses were tested using ANOVA. The analyses examine the effects of five independent variables on the three dependent measures discussed above. The independent measures included internal audit quality (manipulated at three levels: strong, weak and control) and four measured variables (recent client experiences, two conflict management styles, and perceived communication barriers). Different measured independent variables were expected to influence different auditor judgments: recent error experiences, on error attributions (H2); conflict styles, on internal auditor reliance (H3); and communication barriers, on time efficiency expectations (H4).

6.1. Likelihood of error

Table 2 presents ANOVA results for the first dependent measure. As hypothesised, auditor responses were significantly associated with manipulated levels of internal audit department quality (F = 12.16, p < 0.01) and recent participant experience with material client error conditions (F = 5.54, p < 0.05). Participants considering a strong internal audit department condition as-

sessed the likelihood of error as 22%. Participants confronting a weak internal audit department produced an error likelihood assessment of 45% – about double the average in the strong condition. Also as expected, participants who had experienced fewer instances of client error in the preceding 12 months, provided lower error estimates. Thus, hypotheses 1 and 2 are supported.

6.2. Extended procedures

Table 3 presents ANOVA results for the second dependent measure. As hypothesised, auditor responses are significantly associated with manipulated levels of internal audit department quality (F = 11.16, p < 0.01) and two conflict management styles: 'avoid conflict by denial of problem significance' style (F = 5.13, p < 0.05) and 'avoid conflict by working around internal auditor' style (F = 5.91, p < 0.05). Participants considering a strong internal audit department condition assessed the need for extended procedures at 6 on a 10-point scale. Participants confronting a weak internal audit department produced a rating exceeding 8 on a 10-point scale.

Also, the more participants aligned with an 'avoid conflict by denial of problem significance'

Table 3
Summary ANOVA results
Dependent measure 2 - Extend procedures

Source	DF	Sum of squares	Mean square	F	Pr > F	Regression coefficient
Strength of internal audit	2	98.12	49.09	11.16	0.0000	
Client error experience	1	1.14	1.14	0.26	0.6105	0.0206
'Work around IA' style	1	26.01	26.01	5.91	0.0168	0.1404
'Deny problem' style		22.54	22.54	5.13	0.0258	-0.1706
Communication barriers	1	2.49	2.49	0.57	0.4532	-0.0059
All covariates	4	43.19	10.80	2.45	0.0507	
Error	98	431.11	4.40			

conflict management style, the lower they judged the need for extended audit procedures; whereas the more participants aligned an 'avoid conflict by going around the internal auditor' style, the greater they saw the need. Thus, hypotheses 1 and 3 receive support.

Additional hours. Table 4 presents ANOVA results for the third dependent measure. As hypothesised, auditor responses were again significantly associated with manipulated levels of internal audit department quality ($F = 5.04$, $p < 0.01$); and perceptions of communication barriers were likewise significant ($F = 4.38$, $p < 0.05$). Participants considering . a strong internal audit department condition estimated additional hours at 6. Participants confronting a weak internal audit department produced an estimate of 14. Also, participants who had experienced greater communication barriers in the past with internal auditors produced a higher budget estimate. Thus, hypotheses 1 and 4 receive support.

7. Discussion

7.1. Limitations

Before discussing the results of the study, certain limitations will be noted. First, it is possible that auditors may not respond to cases from an experimental approach in the same way they would respond in practice. Although the case includes much of the information typically available for performing the task, it is difficult to build in all forms of the social interaction. However, inclusion of the conflict and communication barrier scales provides a relative advantage to this study. In addition, the information may not have included all 'potentially relevant' information for the analytical procedure task.

Second, since auditors from only one firm participated in the study, inferences cannot necessarily be extended to auditors in general.

Finally, the introduction of a decision aid for the purpose of identifying explanations for the ob-

served turnover ratio variation may have added 'noise' to the reported results. However, the purpose of including the decision aid was to provide participants with a list of possible (valid) environmental and error explanations. They then assessed whether or not the internal auditor department adequately investigated the possible explanations the decision aid produced. The assessment was based on the strengths or weaknesses provided with respect to the internal audit department. Given that the subjects were not asked to determine the actual cause of the ratio fluctuation and the fact that the decision aid did produce valid information, this is not considered to be a significant factor.

7.2. Implications

Two fundamental implications arise from this research: auditors attend to internal audit department quality differences during the analytical procedures part of the audit planning process, and individual auditor differences exhibit significant influence over auditor judgments. We will now address both.

Normatively, external auditors should consider the quality of internal audit personnel and processes in assessing audit risk and in planning audit scope and procedures. Internal auditors have contended, however, that external auditors tend more to increase audit procedures when confronting a weak control environment than to decrease audit procedures in the presence of a strong internal audit condition.

This research, unfortunately, provides mixed findings regarding this concern. The separation of the weak and strong conditions from the control condition are not consistent across dependent measures. While subjects in the strong condition produce significantly lower error estimates than both the weak and control conditions (dependent measure 1), they fail to produce figures significantly lower than the control condition for either dependent measure 2 or 3, although for both de-

Table 4
Summary ANOVA results
Dependent measure 3 - Additional hours

Source	DF	Sum of squares	Mean square	F	Pr > F	Regression coefficient
Strength of internal audit	2	1253.71	626.85	5.04	0.0083	
Client error experience	1	5.85	5.85	0.05	0.8288	0.0466
'Work around IA' style	1	50.04	50.04	0.40	0.5275	0.1948
'Deny problem' style	1	28.43	228.43	0.23	0.6338	0.0466
Communication barriers	1	544.98	544.98	4.38	0.0390	−0.0874
All covariates	4	637.67	159.42	1.28	0.2828	
Error	98	12198.80	124.48			

pendent measures the figures are ordinally lower. For both of these operational decisions (dependent measures 2 and 3), subject responses to the weak condition are significantly higher than the control condition.

This study also reveals that individual auditor differences significantly influence the audit planning judgments examined. The audit planning judgments examined are critically important to the eventual quality of the audit. While the significance of individual auditor differences have been observed before elsewhere, this research attests to the importance of two additional individual, 'experiential-based differences' that have not been the focus of extended prior auditing research: conflict management styles and past communication barriers experienced with internal auditors (leading to current expectations). The findings of this study argue for inclusion of these variables in future audit planning stage judgment research, if not in other audit research as well.

Conflict management styles. It is clear that the style adopted by the auditor can play a significant role in the evidence-gathering process. Depending upon their style, some auditors will be more prone to accept a client's explanation without searching for corroborative evidence. This can result in a significant problem, as the professional standards make it clear that obtaining oral evidence from the client is not considered to be sufficient, competent evidential matter. In the event of a lawsuit, failing to collect necessary evidence could subject the auditing firm to significant liability. Alternatively, other auditors are more prone to do things by themselves. They tend to downplay the client's information and do everything themselves. This can result in a very inefficient audit as the client is often an excellent source for initial information and the client may view such action as a lack of trust (i.e. in this context, in the quality of the internal auditing group). The auditing firm wants neither an ineffective nor inefficient audit and additional staff training that considers the various operating styles would be a good first step to address this potential problem.

Communication barriers. A recognition that barriers exist between internal and external auditors is the first step in improving the communication process between external and internal auditors. As this study indicates, these barriers can have a direct impact on the conduct of the audit. Individuals with high communication barriers scores were more likely to increase the audit hours assigned to a specific task (presumably, rather than discuss the situation with the client's internal auditors).

This directly affects the efficiency with which the audit is conducted. As indicated by SAS No. 65, there are conditions when it is appropriate to place reliance on the work of the internal auditors and perceived communication barriers should not

override such reliance. The implication of this finding is that there should be training to address this issue. Further studies should address potential problems in this area, and educational efforts could then be targeted to help reduce or eliminate the problems.

This study has shown that human beings carry many experiences and learned operating styles into the tasks they undertake. Some tasks are relatively routine and structured where clearly right and wrong answers exist. In these instances individual differences among professionals may exert very limited influence over decisions made. However, in any task that requires significant judgment, individual differences among professionals may exert significantly greater influences as exhibited in this study with regard to the very important risk assessment stage of the audit. In instances where non-normative influences may challenge the quality of the audit, remedial steps need to be contemplated. These steps may include additional employee training, adoption of operational procedures which would add greater structure to the problem (break it into smaller pieces in an attempt to mitigate the influence on non-normative influences), and/or development and implementation of professional decision aids or artificial intelligence products.

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International Variations in the Connections Between Tax and Financial Reporting

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Abstract—This paper constructs a method for assessing the degree of connection between tax rules and practices and financial reporting rules and practices in a country. Five types of connection and disconnection are suggested, and 15 arenas of accounting are proposed for assessment on this basis. The method is applied to four countries, partly in order to test the claim of a clear distinction between Anglo-Saxon and continental European countries.

1. Introduction

A number of papers have begun to investigate the relationship between taxation and financial reporting in a comparative international context (e.g. Haller, 1992; Walton, 1993; Radcliffe, 1993; Quéré, 1994). Hoogendoorn (1996:793) suggests a seven-category classification of 13 European countries based on the relative independence or mutual dependence of tax and financial reporting. However, this was a brief editorial based on a summary of papers by different authors from different countries, writing without a standard approach to assessment of independence or dependence. The classification also gives equal weight to two quite separate issues: the financial reporting treatment of deferred tax and the connection between tax and financial reporting. Consequently, there remains a need for a systematic approach to assessing international variations in the connection between tax and financial reporting. This paper suggests one. It also tests the claim (e.g. Nobes and Parker, 1995, ch. 1) that there is a clear distinction between Anglo-Saxon countries[1] and some continental European countries.

Two aspects of this issue can be separated: taxation as an historical reason for accounting, and the degree of contemporary separation or connection between financial reporting[2] and tax for purposes of profit measurement. The first of these includes the effect of tax considerations on rule-making in financial reporting. Rule-makers and corporate taxpayers will have been alert to potential effects of financial reporting on tax liabilities. A few recent examples of this are mentioned in the text below. However, these issues are largely beyond the scope of this paper and are covered elsewhere (Lamb et al., 1995). This paper concentrates on the second aspect: connections and influences between tax and accounting practice in the

[1] 'Anglo-Saxon' is used here in its European sense to mean those countries, generally English-speaking, where accounting is seen as market-driven and where rules are made by nongovernmental bodies. The UK and the US are examples.
[2] Our study considers connections between taxation and financial accounting (and its output, published financial reporting). It is beyond the scope of our study to consider connections between taxation and other functional parts of accounting practice.
[3] Radcliffe (1993:1) distinguishes 'financial conformity' from 'tax conformity': 'Financial conformity implies substantial reliance on the principle that choice of a particular accounting practice in the financial report is conclusive for tax purposes and that inclusion of particular items therein is a necessary precondition for the grant of tax relief; tax conformity implies the adoption of a general presumption that taxable profit is computed on the basis of generally accepted accounting principles'. (Radcliffe's categorisation is a broader representation of what we have referred to below as Case II and Case III connections between tax and accounting). The existence of either conformity condition is evidence of a strong link between tax and accounting. The dynamic nature of the link, as Radcliffe (1993) demonstrates through his legal study and as we discuss below, makes the observable patterns of influence reciprocal. The Haller (1992) and Ordelheide & Pfaff (1994) discussion of reverse 'congruence' (or 'authoritativeness') in the German context is a broader representation of what we have referred to below as Case IV and Case V connections.

context of existing sets of tax and financial reporting rules.

The argument proceeds as follows. First, we suggest a method of assessing the degree of linkage between tax and financial reporting. Then, we apply this to four countries: the UK, the US, France and Germany. Finally, we ask whether there is a clear distinction between the countries.

2. A method of assessing linkage

We examine here the degree of connection or conformity[3] between (i) tax rules[4] and practices and (ii) financial reporting and practices. It is suggested that five cases[5] of connection or disconnection for any particular accounting 'arena' (e.g. depreciation of fixed assets) can be distinguished, as in Table 1.

The issue here is not whether the economic decisions of management are affected by tax. We presume that this is the case for many decisions in all countries. The issue is the degree to which financial reporting practice and tax practice are connected in an operational sense. The cases in Table

1 are presented in increasing order of the influence of tax on financial reporting decisions (the latter are also referred to below as accounting policy choices). Case I is disconnection of tax rules and practice from financial reporting rules and practice. This suggests lack of influence of tax on financial reporting decisions.

The other four cases involve various forms of connection. Case II is where there are tax rules and financial reporting rules without major options, and the rules are the same. This suggests that there is limited room for tax considerations to affect accounting policy choice by managers. In Case III, the accounting rules are more detailed than the tax rules, and tax practice is to follow accounting practice. Initially, this suggests the influence of accounting on tax. However, where the accounting rule allows choice or is vague, there may be a 'reverse effect' whereby the financial reporting rules (or options in them) are chosen, interpreted or shaped with the tax effect in mind. Examples of Case III where such a reverse effect seems most likely are shown as 'III†' in Table 2.

Cases IV and V are clearer examples of tax influence on accounting policy choice. In Case IV, there is no precise financial reporting rule, so a tax rule is followed for convenience or a tax option is chosen in order to reduce tax liabilities. In Case V, financial reporting rules are overridden.

We suggest a number of accounting arenas which can be assessed to determine the cases of linkage for any particular country.[8] The first col-

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[4] 'Rules' refer to authoritative practice. By far the most common source of rules in the analyses that follow is legislation: primary, secondary or tertiary. However, rules which govern practice may also be drawn from case law or extra-statutory guidance, produced by tax authorities. The key to our recognition of a 'rule' is whether or not it governs observable practice in the majority of cases. We have endeavoured to consider the rules in effect at 1 January 1996 and to base our comparative analysis at this date. Changes in details and shifts in patterns of interrelations between tax and accounting since that date are inevitable, and, where significant, have been noted.

[5] The classificatory scheme rests upon the authors' judgments concerning interrelationships. For a review of methodological issues in international accounting classification, and the importance of judgment, see Roberts (1995).

[8] More accurately, this could be applied to any particular combination of tax system and accounting system. Some countries have more than one accounting system. For example, group accounts may use different rules from individual accounts.

Table 1
Cases of linkage between tax and financial reporting

Case I	**Disconnection**	The different tax and financial reporting rules (or different options) are followed for their different purposes.[6]
Case II	**Identity**	Identity between specific (or singular) tax and financial reporting rules.
Case III	**Accounting leads**	A financial reporting rule or option is followed for financial reporting purposes, and also for tax purposes. This is possible because of the absence of a sufficiently specific (or singular) tax rule.[7]
Case IV	**Tax leads**	A tax rule or option is followed for tax purposes, and also for financial reporting purposes. This is possible because of the absence of a sufficiently specific (or singular) financial reporting rule.
Case V	**Tax dominates**	A tax rule or option is followed for tax and financial reporting purposes instead of a conflicting financial reporting rule.

[6]Such disconnection will be recognised when distinct, independent and detailed tax and financial reporting operational rules exist. Even if measurement outcomes are essentially the same, the particular arena may still be characterised as Case I; the independence and completeness of the sets of rules 'disconnects' tax and accounting in an operational sense.
[7]This case may be either *de facto* identity or an instance where financial reporting is the 'leader'. It may be difficult to distinguish between the two circumstances. However, both indicate a *prima facie* financial reporting influence on tax.

Table 2
Tax linkage in material arenas of financial reporting

Arena		Connection or disconnection case			
		UK	*US*	*France*	*Germany*
1	Fixed asset recognition and valuation	I	II (possibly IV)	II*	III, IV (and sometimes V)
2	Financial and operating leases	III†	Small operating lease payments: II	II*	IV
			Other lease payments: I		
3	Depreciation (a) normal (b) excess	I n/a	I n/a	IV V*	IV V
4	Contingencies, provisions	I (possibly III)	I	II*	III†
5	Grants and subsidies	I	II	III	IV
6	Research and development costs	I	III	III†	III†
7	Inventory valuation: (a) flow assumptions (b) other areas	II III†	IV III†	II* II	IV IV
8	Long-term contracts	III in most cases	I (possibly IV in elements of details)	IV	III
9	Interest expense (a) capitalisation (b) other	I II	I I**	IV* III	III III
10	Foreign currency transactions	I**	I**	I	III
11	Non-consolidation purchased goodwill	I	I (IV may become the norm under new rules)	I	V
12	Pensions	I	I	IV	IV
13	Policy changes and fundamental errors	I	I	III, I	III
14	Scope of the group	I	I	I	I
15	Fines, charitable donations, entertaining expenses	I	I	I	I

Key: Cases I–V   As defined in Table 1.
*   Case I is specifically allowed or required for group accounts.
**   Strictly Case I, but measurements are identical in normal circumstances.
n/a   Not applicable, because there is no distinction for accounting or tax between normal and excess depreciation.
†   Examples of Case III where a reverse effect (i.e. tax considerations influencing financial reporting) seem particularly likely.

umn of Table 2 lists these arenas, which were cho-
sen on the basis that they were sufficiently impor-
tant[9] to warrant coverage[10] by an International
Accounting Standard.

The discussion is set primarily in the context of
listed companies, which encompass a large pro-
portion of the economic activity of the four coun-
tries considered. As Walton (1993) notes, smaller
companies' accounts may present information
with tax users primarily in mind. In general, the
comparative international issues discussed here ap-
ply to both listed and other companies. We con-
centrate on the rules in force in 1996.

The focus of most of our discussion is individual
company financial statements, as these are the ba-
sis for tax computation[11] in each of the four coun-
tries. However, we will also highlight the relation-
ship between taxation and financial reporting in
the context of consolidated accounts. In the UK
and the US, one would generally expect the same
accounting policies to be used for parent and con-
solidated financial statements. This is not the case
for some large French and German groups.

3. Application to four countries

Our classification of arenas by country into the
five cases are, of course, subjective in the sense that
judgment is required; first, in deciding how rules
of accounting and taxation will normally be ap-
plied, and second, in deciding to which case the
manner of application best corresponds. In the
first sense, we are doing nothing more than repli-
cating the application of professional judgment in
practice. We have ensured the realism of our pro-
fessional judgments of rule application and case
classification by (i) extensive research in primary
and secondary sources of tax and accounting rules;
(ii) discussion among the three authors and refer-
ence to the original sources; and (iii) consultation
with a minimum of two experts in each country to
confirm our replication of professional judgments
and subsequent case analysis. We explain the clas-

sifications in the text below, providing references
for the rules.

Given the general reliance of tax rules on ac-
counting practice for all the countries covered by
this study, it is not surprising that there are many
examples of Case II and Case III conformity; to
this extent, we could regard such conformity as the
'normal' state of affairs in any country. For ex-
ample, on the whole, the tax rules do not specify
treatments for such issues as sales, wages and most
business overheads, so Case III conformity is
normal.

3.1. The UK

A distinction between accounting profit and tax-
able profit—caused largely by definitions and dis-
tinctions incorporated into tax law—has been re-
cognised since the late nineteenth century
(Freedman, 1987; Lamb, 1996). Where there is no
specific tax law to the contrary, recent UK case
law has helped to clarify that modern accountancy
practice will apply in normal circumstances. De-
spite the possibility that established legal concepts
could overrule accountancy practice, a judge's rul-
ing 'will not override a generally accepted rule of
commercial accountancy which (a) applies to the
situation in question[,] (b) is not one of two or
more rules applicable to the situation[,] and (c) is
not shown to be inconsistent with the true facts or
otherwise inapt to determine the true profits or
losses of the business' (Freedman, 1993:477).
Therefore, net profit before taxation as shown in
the published accounts of limited companies is the
usual starting place for tax computations, but
many adjustments in theory and in practice can be
made.

An example of an unusually complex Case III
relationship is the current treatment of lease ac-
counting. The capitalisation of leases was unusual
in the UK before the passage of Statement of Stan-
dard Accounting Practice (SSAP) 21 in 1984.[12] The
Accounting Standards Committee (ASC) con-
firmed with the tax authorities that the application
of SSAP 21 would not alter the tax position, i.e.
rental payments under all leases[13] would remain
deductible expenses for tax purposes (a Case I dis-
connection). However, a subsequent Inland Rev-
enue Statement of Practice (confirmed by case
law)[14] requires the tax basis to follow the account-
ing basis in normal circumstances (a Case III
relationship). Accounting leadership is established
by reference to the categorisation of leasing agree-
ments as 'operating leases' or 'finance leases'.

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[9] This may not mean that all these differences between tax
and accounting rules are material in size. This will vary by
sector, country, etc. Nevertheless, we hope that this method will
include most material issues.

[10] We have eliminated those International Accounting Stan-
dards (IASs) which seem irrelevant for our thesis because they
do not affect the profit measurement of individual companies
in the countries studied: those on disclosure (IASs 1, 7, 14, 15,
24, 30, 32 and 33); associates and joint ventures (IASs 28 and
31); IAS 26 on accounting by pension plans; and IAS 29 on
hyperinflation. We have also left out IAS 12 on taxation (in
order to avoid circularity) but have added the arena of fines,
donations, etc. as a catch-all for tax/accounting disconnections
which are common in all four countries. We use IASs as at the
end of 1997.

[11] Very limited exceptions to this generalisation may apply
in relation to groups of companies. However, rules of tax con-
solidation exist where appropriate. See Lamb (1995: 38–9) for
a discussion of this aspect of group taxation.

[12] SSAP 21 applied to accounting periods beginning on or
after 1 July 1987.

[13] Provided, in general, that the leases themselves, and the
profile of payments, conformed to normal commercial practice.

[14] SP 3/91 and *Gallagher v. Jones, Threlfall v. Jones* (1993)
STC 537.

Rental payments for operating leases are deductible in arriving at profit measured for financial reporting and tax purposes. In contrast, under new Inland Revenue practice 'inspectors will normally be prepared to accept that the properly computed commercial depreciation of the asset which is charged to the profit and loss account in the period' represents, together with the finance charge element of finance lease rentals, the appropriate tax deduction.[15] In principle, there are no major choices in the accounting rules. However, given the amount of judgment required to distinguish an 'operating lease' from a 'finance lease' under the terms of SSAP 21, there may be a reverse effect (as for many other Case III areas), in that the directors may wish to capitalise or not for tax purposes and therefore may seek to apply SSAP 21 in particular ways.

In the field of inventory valuation, LIFO is not acceptable for tax purposes in the UK,[16] nor generally for accounting purposes[17] (i.e. a Case II relationship). Other aspects of inventory valuation—recognition and categorisation of costs and lines of inventory—are generally subject to Case III conformity.[18] A reverse effect—application of the financial reporting rule with a tax effect in mind—may apply to such aspects of inventory valuation. Given the flexibility of SSAP 9's criteria for the use of the percentage-of-completion method, a reverse effect may also apply to long-term contract accounting. However, Case III conformity (and the scope for reverse effects) is limited by the Revenue's reluctance to accept provisions for foreseeable losses on long-term contracts as calculated in accounts; Inland Revenue guidelines[19] have been provided to deal with such provisions.

The UK treatment of provisions is an arena generally characterised by Case I disconnection. Tax law tends to distinguish between 'general provisions', which are not deductible for tax purposes, and 'specific provisions', which are. A combination of specific legislation and case law has established the clear distinction between 'general' and 'specific' in relation to provisions for bad debts[20] and repairs.[21]

The position for other sorts of provisions is less clear. In a recent case[22], Britannia Airways' provision for future aircraft engine overhaul was accepted as tax deductible, even though the costs had not been incurred, nor the time for overhaul arrived. The High Court's decision rested on the facts that (i) there was no specific tax law that dealt with this type of provision and (ii) that commercial accounting, as reflected in the company's audited accounts, accepted the provisions as accounting expenses. In other words, the Court accepted that a Case III connection existed. However, the strength of the Britannia Airways precedent for law and practice is not yet clear: the case sits somewhat uneasily with the tax treatment of other types of provisions. The extension of the Case III 'imperative' beyond the facts of the particular case is not yet clear;[23] and certain UK accounting standard setters seem unconvinced that Britannia's accounting treatment is an acceptable form of commercial accounting.[24] All in all, it is considered that Case I best characterises the current disconnection of tax and accounting rules in this arena.

Most other material arenas in UK financial reporting (see Table 2) involve quite separate rules for tax and financial reporting (Case I). Fixed assets and their depreciation provide good examples of this. It is provided in law[25] that fixed assets may be revalued in various ways, and this is common practice in the UK, particularly when property prices are rising. Revaluation (upward or downward) is ignored for tax purposes.[26] Similarly, depreciation for financial reporting purposes is controlled by company law and accounting

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[15] SP 3/91, paragraph B 10–11.

[16] SP 3/90 and *Minister of National Revenue v. Anaconda American Brass Ltd.* (1956) AC 85.

[17] SSAP 9 suggests that LIFO will not normally give a true and fair view.

[18] 'The Revenue accepts any method of computing the value of stocks, which is recognised by the accountancy profession, so long as it does not violate the taxing statutes as interpreted by the Courts' (SP 3/90, paragraph 2).

[19] SP 3/90, paragraph 7.

[20] ICTA 1988, s. 74(1)(j); *Anderton and Halstead Ltd v. Birrell* (1931) 16 TC 200; and *Dinshaw v. Bombay Commissioner of Taxes* (1934) 13 ATC 284. Inland Revenue Interpretation,

Tax Bulletin: 12, August 1994 concerns the evidence required to justify the deduction of a bad debt provision.

[21] ICTA 1988, s.74(1)(d) for the basic legislation.

[22] *Johnston v. Britannia Airways Ltd.* (1994) STC 763.

[23] Clarification of the Revenue's views was sought by the Tax Faculty of the ICAEW in early 1995. For provisions such as warranty claims and closure costs, the Revenue made clear that normal practice would be to follow commercial accounting principles, but subject to judicial tests established by case law and in statute. The suggestion that a taxpayer might be able to claim a more prudent deduction than shown in commercial accounts was dismissed. (*Taxes*, 1995: 513–4 summarises the Inland Revenue guidance.)

[24] The Britannia Airways overhaul provision is, *prima facie*, inconsistent with the definition of 'liability' included in the ASB's draft *Statement of Principles* (see Chapter 3). Instead, the original purchase of the 'asset', the new aircraft, may in substance be better represented as the purchase of the aircraft (with a long useful life) and the purchase of a right to fly the aircraft (with a useful life that will expire after a much shorter period of flying) until the first overhaul. See Green (1995) and Whittington (1995) for summaries of these issues.

[25] CA 1985, Sch. 4, para. 31.

[26] Taxable capital gains or losses are calculated by reference to purchase cost, revaluation at particular dates and a form of indexation unrelated to financial reporting; TCGA 1992, Ss. 35, 38, 272.

standards,[27] but is not deductible against taxable income.[28] Instead, a scheme of capital allowances sets out the available tax depreciation.[29]

Case I disconnection also operates in the following arenas:

(i)   *grants and subsidies*: tax treatment starts from general tax principles to distinguish 'capital' from 'revenue',[30] rather than by using the accounting rules in SSAP 4;

(ii) *research and development expenses*: tax rules[31] specify expensing even if development expenditure is capitalised under the rules of SSAP 13;

(iii) *non-consolidation purchased goodwill*: tax rules preclude an expense for amortisation of goodwill;

(iv) *pension costs*: tax allowances are calculated on a different basis[32] from that used by SSAP 24; and

(v)   *fines, charitable donations, entertaining expenses*: tax rules very substantially restrict deduction for such expenses.

Two further Case I arenas are worth comment: foreign currency and changes in accounting policy. For foreign currency transactions, the tax rules[33] have recently been changed to bring them more into line with the financial reporting rules dealing with foreign exchange (SSAP 20).The method of this attempt to create greater conformity was to recreate a parallel set of 'commercial accounting rules' for tax purposes. Certain parts of the new legislation have been written in such a way that crucial measurement variables may be chosen in a manner that will permit compliance with both sets of rules: this is the case with Section 150, Finance Act 1993 which allows sufficient flexibility in the choice of translation rates for accounting/tax mismatches to be avoided (Muray and Small, 1995:19). Such provisions would suggest a Case III relationship between accounting and tax rules. However, the differences in detail remain so extensive that it still seems reasonable to describe this arena as Case I.[34]

The arena of changes in accounting policy and correction of fundamental errors also provides an example of Case I. For accounting purposes (FRS 3), these items are treated as prior year adjustments (i.e. the opening balance sheet is adjusted), whereas for tax purposes prior year assessments are amended or, in the case of acceptable[35] changes in accounting policy, are absorbed in the year.[36]

Historically, another example of Case I was that the UK tax system operated on a cash basis for interest and similar receipts or payments,[37] whereas financial reporting worked on an accruals basis. However, new rules for interest introduced in 1996 better align the tax rules with the accounting rules (i.e. establish a Case II relationship). Identity of measurement rules is achieved, but the new tax rules are very detailed as far as the tax categorisation of debits and credits related to 'loan relationships' are concerned; it is not a simple matter of tax rules being required to follow the accounting requirement.[38] Capitalisation of interest on construction projects is not followed for tax purposes (Case I).

As with the other countries considered here, group structures for tax purposes (e.g. loss reliefs, ACT surrender, chargeable gains)[39] are quite different from those for financial reporting as in the Companies Act and FRS 2.

In summary, the UK has many arenas characterised by Case I disconnection, despite general

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their detail. Although there was an intention at the time of the creation of the new tax legislation that it should recreate existing accounting rules, there is no in-built mechanism for that substantial measure of congruence to be, of necessity, maintained in the future; accounting and tax rules can develop in their own separate ways in the future. This is the characteristic structure of traditional tax rule setting in the UK. As Muray and Small (1995: 19) explain, the complexity arises because 'a modern and sophisticated tax régime had to be laid over the top of an archaic and excessively complex framework.....Without the schedular system, the distinction between [types of taxable income] would have been unnecessary and no special loss relief rules would have been needed. The extraordinary contortions demanded by the regulations dealing with deferral calculations...could have been dispensed with'. As will be discussed below in connection with the US, such complex detail of tax rules, even when intended to replicate in substance commercial accounting rules, may lead to moves over time to a Case IV relationship between accounting and tax.

[35] 'Acceptable' generally means in accordance with the law and accounting standards.

[36] *Pearce v Woodall-Duckham Limited* (1978) CA, 51 TC 271.

[37] ICTA 1988, Ss. 337–338; IR Int. 3.

[38] A company has a 'loan relationship' if it is a debtor or creditor with regard to any debt which is a loan under general law, e.g. gilt-edged securities, corporate bonds, bank loans and overdrafts. Normally amounts payable and receivable are included in the tax computation on an accruals basis. However, if the relationship has been entered into for trade purposes, then the income or expense is treated as part of taxable trading income; otherwise, the income or expense is dealt with under other tax recognition rules (Melville, 1997: 364, 427).

[39] For example, ICTA 1988, Ss. 240, 402, 413, 770; and TCGA 1992, Ss. 170, 171, 175.

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[27] CA 1985, Sch. 4, paras. 17-19, 32; SSAP 12.

[28] Save in respect of finance lease assets capitalised in conformity with SSAP 21. See above.

[29] CAA 1990, Ss. 24, 25, 159.

[30] Accounting and tax will almost always distinguish the general nature of government grants and subsidies in the same way. There is a substantial degree of accord concerning what is 'capital' in this context. However, SSAP 4 treatment of a capital grant is irrelevant to its tax treatment which depends on the type of asset to which it relates and the tax depreciation rules, if any, that apply. Revenue grants and subsidies will effectively be treated in the same way for tax and accounting.

[31] CAA 1990, part VII.

[32] ICTA 1988, Ss. 74, 592.

[33] SP 1/87 until April 1995; then FA 1993, Ss. 125-170, Schs. 15-17 and FA 1994, Ss. 114-116, Sch. 18.

[34] The different vocabulary, definitions and statements of rules create distinct sets of references that are disconnected in

principles of judicial tax law that tend toward 'tax conformity' (Radcliffe, 1993) and that emphasise the importance of commercial accounting in 'leading' tax treatment.

3.2. The US

Under the current Internal Revenue Code (IRC), there is no general requirement of conformity between taxable profit and financial statement profit. However, there is an apparently strong link between tax law and accounting in Section 446(a) IRC 1986 which states: 'taxable income shall be computed under the method of accounting on the basis of which the taxpayer regularly computes his income in keeping his books'. Most companies adopt the accruals method as their 'method of accounting' and GAAP for tax profit calculations. Relatively recent changes make clear that the phrase 'method of accounting' may be defined in such a way as to permit divergence from financial accounting in a number of circumstances.[40]

Although there is an absence of 'presumptive equivalency'[41] between accounting and tax measurement of profits, and although the opportunities for permissive disconnection of accounting and tax measurements have increased over time, US recognition of taxable profits rests on a bedrock of *de facto* conformity with commercial accounting. Therefore, we should not be surprised to find examples of Case II identity between tax and accounting rules in important areas of measurement. In most circumstances, such identity exists in the arena of fixed asset valuation (other than depreciation—see below).[42] However, as the tax rules[43] for the valuation of tangible fixed assets are often more specific and detailed than accounting GAAP,[44] a number of Case IV (tax leader) rela-

tionships may operate to support the identification and categorisation of historical costs for tax purposes. For example, uniform capitalisation rules for tax purposes[45] require direct costs and some indirect costs of fixed assets produced by the taxpayer to be capitalised, not expensed; categorisation for accounting purposes will provide *prima facie* evidence concerning the nature of costs.

Perhaps more characteristic, given the detailed nature of tax regulation, are those arenas characterised by Case III or Case IV conformity. In Case III examples, the detailed tax regulations outline a number of acceptable approaches, whereas the financial reporting rules are more constrained and will tend to be adopted for both purposes. In Case IV examples, the detailed tax guidelines will tend to be followed (or may have to be followed) rather than a more general, or an alternative, financial reporting rule.

In the arena of research and development expenditure, the accounting rule[46] is clear: research and development expenditure should be treated as an expense. The tax rules are more permissive: research and development expenditure incurred may be expensed, but if not, depreciation or amortisation over a specified period is possible.[47] Although the detailed accounting and tax rules are written without reference to one another, this arena seems characterised by a Case III relationship, without room for much reverse effect: if research and development expenses are written off in accounts in accordance with SFAS 2, then for tax purposes Section 174(a)(1) IRC 1986 will apply and will give the same treatment.

Inventory valuation is an arena where tax rules[48] state explicitly that 'best accounting practice' should be adopted to find appropriate valuation rules, provided 'income is clearly reflected'. In normal circumstances, therefore, tax and accounting valuations are identical. Both sets of rules[49] permit companies to choose a valuation method from a range of options—FIFO and LIFO are within the range of acceptable flow assumptions. However, given that the tax rules normally require conformity of flow assumption with financial reporting,[50] the tax option that has the most beneficial tax effect (e.g. LIFO in periods of rising inventory costs)

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[40] Reg. § 1.446-1(a)(1) defines 'method of accounting' as 'not only the overall method of accounting of the taxpayer but also the accounting treatment of any item'. The taxpayer adopts an overall method of accounting and methods of accounting for particular items when first filing a tax return. The method(s) must thereafter be applied consistently, unless IRS approval is obtained for a change in overall method of accounting or for the method of accounting of a 'material item used in such overall plan' (Reg. § 1.446-1(e)(2)(ii)(a)). With some exceptions, the IRS no longer imposes 'a financial statement conformity condition on proper to proper changes in accounting method'; a year-end reconciliation is the only requirement (Godshalk, 1994: 159). Thus, financial accounts and tax computation 'methods of accounting' are permitted to diverge. Such a divergence does not apply to the LIFO choice; see footnote 50.

[41] *Thor Power Tool Co. v. CIR* (1979) 58L Ed. 2d 785.

[42] The same analysis applies to the treatment of grants and subsidies under tax and accounting rules. Neither system of rules deals with the impact of grants and subsidies on profit as an explicit subject. Instead, historical cost measurement takes this aspect into account. If grants or subsidies were not capital in nature, general principles of income recognition would apply for tax and accounting purposes.

[43] Sections 263A, 1011–1013, IRC 1986; Regs. § 1.1012-1.

[44] SEC rules and Accounting Principles Board Opinion (APBO) 6 (1965).

[45] Section 263A IRC 1986.

[46] Statement of Financial Accounting Standards (SFAS) 2 (1974).

[47] Section 174 IRC 1986.

[48] Section 471 IRC 1986; Regs. § 1.471-1; Regs. § 1.471-2.

[49] Inventory accounting is governed by Accounting Research Bulletin (ARB) 43: 4 (1953).

[50] Section 472(e) IRC 1986 requires that taxpayers who adopt LIFO methods must use the same method in their financial reports. Regs. § 1.472-2(e) deals with this LIFO 'report rule' in more detail.

will tend to be adopted for financial reporting,[51] to the exclusion of other options. Therefore, characterisation of the tax/accounting relationship as Case IV, rather than Case II, seems appropriate. The close link between accounting and tax in this arena is made clear by the requirement that taxpayers must obtain tax authority approval for any change in method of valuing inventory.[52]

In other respects, tax and accounting rules detail the types of inventory costs to be taken into account and the methods for reaching appropriate measures of cost. Despite the detail, the method of measurement advocated in each set of rules is consistent and, therefore, the financial reporting treatment normally leads the tax treatment (Case III): that this should be so seems clear from the reference to 'best accounting practice' in tax rules.

The distinct and separate purposes of tax and accounting rules (Case I) were clearly evident in the arena of long-term contracts until changes to tax law introduced in 1986: accounting rules[53] permitted the completed-contract or percentage-of-completion methods to be used (depending on the circumstances), while the tax rules required the use of the completed-contract method. The 1986 tax change[54] requires the percentage-of-completion method, defined in detail in the tax law, to apply to most long-term contracts.[55] As the choice for financial reporting does not depend on the tax rules, and *vice versa*, this remains a Case I relationship. However, when the percentage-of-completion method is applicable under both sets of rules, the more detailed tax basis of calculation is likely to be adopted, too, for financial reporting purposes. A secondary Case IV relationship may, therefore, apply to elements of measurement.

The fact that there is no presumptive equivalence in the US between tax and financial reporting, together with an institutional recognition of the separate, distinct purposes of tax accounting and financial reporting,[56] means that Case I disconnection of tax and financial reporting is likely to be an important feature of the US system. We find Case I disconnection in a number of arenas:

(i) *Fixed asset depreciation*: The accounting rules[57] are distinct and separate from the tax rules.[58] The latter are very detailed and specify, *inter alia*, the method of depreciation to be used; guidelines for the length of useful life; salvage value should be equal to zero; and the convention of depreciation to apply in years of acquisition and disposal.

(ii) *Non-consolidation purchased goodwill*: Accounting rules[59] require amortisation over an expected useful life of no more than 40 years. Until 1993 the tax/accounting relationship was Case I because no tax deduction was available for goodwill. Under new rules introduced in 1993[60], certain non-consolidation purchased goodwill may be amortised over 15 years. The tax/accounting relationship remains, strictly, Case I but it is possible that a reverse effect will become evident to make the choice of useful life for accounting purposes tend to be at or near 15 years for reasons of simplicity.[61]

(iii) *Accounting for leases*: Accounting and tax rules are detailed and apply for their distinct purposes.[62] The accounting treatment of payments under leases depends, under SFAS 13, on whether or not the lease is classified as a capital lease. The tax rules do not recognise the concept of capital lease, but are concerned with ascertaining the permissible de-

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[51] There is, of course, a trade-off between tax savings and reported earnings. A large literature exists concerning the implications of the choice of LIFO by management (e.g. Sunder, 1973, 1975; Ricks, 1982).

[52] Section 446(e) IRC 1986 and Regs. § 1.446–1(e). A number of other changes in method of accounting require prior Internal Revenue Service (IRS) approval. However, most of the other circumstances have greater impact on unincorporated businesses or small companies and are likely to have an impact on financial statements prepared for tax accounting purposes only. Special notice provisions apply to the adoption of LIFO.

[53] ARB 45 (1955). Both methods are acceptable, but the percentage-of-completion method is preferable when costs to completion estimates are reasonably reliable. Otherwise, the completed-contract method should be used.

[54] Bittker and Loklan (1989, ¶106.2.1) explain that the purpose of the 1986 change was to eliminate the deferral of taxable income permitted by adoption of the completed-contract method. They quote (fn. 3) a Congressional report as saying 'corporations had large deferred taxes attributable to this accounting method and low effective tax rates. Annual reports for the large defense contracts indicate extremely low (or negative) tax rates for several years due to large net operating loss deductions arising from the use of the completed-contract method' (H.R. Rep. No. 426, 99th Cong., 1st Sess. 625–26).

[55] Section 460 IRC 1986.

[55] *Thor Power Tool Co v CIR* (1979) 58L Ed. 2d 785.

[57] ARB 43, Chapter 9A (1953); ARB 44 (revised 1958).

[58] Sections 167, 168, 197 IRC; Regs. 1.167(a); Regs. 1.446–1(a). Nevertheless, the 1913 income tax law defined the depreciation rules that were then widely adopted for accounting purposes (Watts and Zimmerman, 1979).

[59] APBO 17 (1970).

[60] Section 197 IRC 1986. An 'amortisable section 197 intangible' means, broadly, purchased business 'goodwill', 'going concern value', business records (including customer lists and market intelligence), intellectual property and know-how, and 'workforce in place including its composition and terms and conditions...of its employment'. Self-created 'goodwill' will normally fall outside the definition of an 'amortisable section 197 intangible'; the exceptions are, broadly, property rights that have been legally documented (e.g., as a licence, trademark or covenant agreement). Detailed rules make clear that recognition of 'amortisable section 197 intangibles' will normally occur in connection with the purchase of assets amounting to a going concern.

[61] While a longer useful life may be justified and permissible for financial accounting purposes, equal amortisation for tax and accounting reduces the complexity of deferred tax calculations.

[62] SFAS 13 (1976); Section 467 IRC 1986; Regs. § 1.446–1(a).

duction of rent accrued under the lease for the period in question. Small operating lease payments (aggregate payments up to $250,000) will be presumed to follow the normal accounting method; other lease rentals will be deductible according to specific tax rules and calculations.

(iv) *Provisions and contingencies*: Accounting rules[63] require recognition of liabilities (and any consequential expense) where it is probable that losses have been incurred at the financial statement date and the amount can be reasonably estimated. Tax rules permit an expense deduction only when 'incurred', a concept defined by reference to specific statutory tests which take into account financial reporting treatment,[64] but must conform to a judicial test of appropriate accrual (the 'all events' test). The effect of the combined tax rules tends to make the tax concept of accrual more restricted than the accounting concept, which is defined in probabilistic terms to a far greater degree. Despite the explicit influence of the accounting treatment on the tax treatment, this remains an area best described as Case I because of the independence of the tests of judgment reserved to the distinct tax and accounting purposes.

(v) *Interest expense*: Tax rules[65] permit a deduction for interest accrued, but numerous special rules apply to deal with, *inter alia*, interest on indebtedness to fund corporate investment[66] and capitalised interest.[67]

(vi) *Foreign currency gains/losses*: Tax rules[68] will, in general, permit the gain or loss associated with accrued income and expenses to be recognised or deducted from ordinary income. Such treatment is consistent with the accounting rules[69] applicable to individual company accounts.[70] However, detailed rules exist to govern the tax treatment of foreign dividend flows.[71]

(vii) *Pension costs*: Accounting for employers' pension costs is an arena where tax and accounting rules diverge in their detail, impact on profit measurement, and intention. Ac-counting rules[72] aim to ensure full recognition (using an actuarial method of calculation) of the pension costs and allocation to the periods in which they accrue. Tax rules[73] are more concerned to ensure that tax deductions are given for contributions made at an acceptable level to an acceptably constituted plan (e.g. a Section 401 qualified pension plan).

(viii) *Accounting policy changes and correction of fundamental errors*: The accounting rules[74] require prior year adjustment in certain cases. Tax rules require that certain accounting policy changes ('changes in accounting method' for 'material items' as defined in regulations) should be approved by the IRS in advance and, once approved, should be reflected in the year of the change.[75] Taxpayers may be able to take advantage of an option to reconstruct earlier years' calculations of taxable income to reflect the change of policy.[76] Fundamental errors will generally be corrected by adjustment of earlier years' taxable income.

(ix) *Group recognition*: The consolidated income tax return rules are defined in a manner entirely distinct from the accounting rules governing the recognition of an accounting group for consolidated accounts purposes.[77]

(x) *Fines, charitable donations, entertaining*: Accounting rules apply the general matching principle to recognise such expenses. Tax rules restrict the deductibility of these expense categories: in general, fines are disallowed; charitable contributions are restricted to 10% of a corporation's taxable income;[78] and many business entertaining expenses are disallowable or restricted by a 50% limitation.[79]

Although its volume and detail suggests the separateness of the tax accounting regime (and creates a number of Case I disconnections), US tax officials are free to observe, choose and adapt practices and rules from commercial accounting and financial reporting regulation[80] to suit tax pur-

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[63] SFAS 5 (1975).

[64] Section 461(h)(3)(B) IRC 1986.

[65] Section 162(a) IRC 1986.

[66] Section 279 IRC 1986.

[67] Section 460 IRC 1986. Accounting rules would permit an interest deduction on an accruals basis, subject to special treatment for interest capitalised—SFAS 34 (1979).

[68] Sections 985–988 IRC 1986.

[69] SFAS 52 (1981).

[70] The translation of the results of overseas subsidiaries' accounts in consolidated group accounts has no applicability for tax purposes.

[71] The calculation of earnings and profits under Section 986 IRC 1986.

[72] SFAS 87 (1985); SFAS 88 (1985).

[73] Section 404 IRC 1986.

[74] APBO 9 (1966) and APBO 20 (1971); SFAS 16 (1977).

[75] Section 446, IRC 1986 and Regs. § 1-446-1(e).

[76] Section 481(a), IRC 1986 and Regs. § 1-481-1 and § 1-481-2.

[77] Sections 1501 and 1504 IRC 1986; ARB 51 (1959).

[78] But the excess may be carried forward.

[79] Sections 162, 170 and 274 IRC 1986 respectively.

[80] As many of the tax rules detailed above apply equally to companies that publish financial reports, companies not subject to public reporting requirements, and unincorporated businesses, detailed tax rules will define the primary accounting rules for many enterprises. It is unsurprising that tax authorities adopt sound financial reporting principles when trying comprehensively to define adequate standards of accounting.

poses. An indicator of the responsiveness of tax authorities to, and their awareness of, changing commercial accounting circumstances is the frequency and volume of changes in tax statutes and regulations.[81] Such frequency and volume constitutes part of a plausible explanation of the persistence of Case III and Case IV connections in the context of a tax accounting regime seemingly predisposed to disconnection. Further, the reliance on very detailed income tax regulations to articulate and clarify applications of primary legislation permits the tax authorities to rationalise circumstances when accounting is permitted to lead tax (Case III) and to specify those conditions when tax requirements should lead accounting (Case IV). The balance of influence in the relationship (i.e. should it be seen as Case III or Case IV?) may depend on the extent to which tax accounting detail overwhelms—for relative simplicity or to save effort—the rules in financial reporting standards.

3.3. France

A key requirement of the *Code General des Impôts* (General Tax Code—CGI)[82] is that, for tax purposes, businesses must respect the definitions set out in the *Plan Comptable Général* (General Accounting Plan—PCG) to the extent that they are not incompatible with the tax base (*l'assiette d'impôt*). This emphasises the significance of accounting for tax purposes.

The many Case II connections between tax and accounting reflect the historical development of tax and accounting rules in France (Frydlender and Pham, 1995; Mikol, 1995). Tax influence on company financial reporting can be illustrated by a consideration of the rules concerning accounting for tax-deductible or regulatory provisions (*provisions reglementées*) and the difference between economic and fiscal depreciation (*amortissements dérogatoires*).

Regulatory provisions are defined in the PCG as provisions which do not correspond to the usual object of a provision[83] and are accounted for as a result of statutory regulations. In effect, these provisions are created for purely tax reasons; they include provisions for price increases in stocks, for exchange rate fluctuations relative to stocks (until 1998), for investment arising from employee share ownership, and for allowable industry-specific provisions. If a business wishes to claim the benefits of these provisions (and fiscally-calculated depre-

ciation), the CGI[84] requires that entries must be made within the financial accounting system of the business. That is, in order to claim accelerated depreciation, the business has to charge it in the profit and loss account (i.e. Case V).

The total depreciation is split between an economic charge to operating expenses and an excess fiscal charge to extraordinary expenses. The 1983 PCG recognised this fiscal occupation of the space of financial accounting by creating a set of account codes to handle these tax requirements. The bookkeeping involves a debit to the extraordinary items caption in the profit and loss account and a credit to a regulatory provisions caption on the capital and liabilities side of the balance sheet.

For normal depreciation expenses, there is also a connection between tax and accounting. The tax rules incorporate a number of specific requirements: the use of zero disposal values; guidelines on useful lives; and pro rata charges for assets bought or sold in the year. These rules seem to be derived from generally accepted commercial practice. Now that they have become tax rules, accountants tend to follow them for convenience; thus, the treatment of normal depreciation is an example of a Case IV tax/accounting relationship.

The general rules for asset valuation in individual company accounts are a clear *de jure* connection (Case II) between tax and accounting rules. The accounting rules[85] set out the general historical cost basis for the valuation of assets, and the wording used is effectively the same in the relevant section of the CGI.[86] However, there are nuances to this general identity. For example, there is a potential divergence between tax and accounting practice in the treatment of interest on borrowings used to finance fixed assets under construction. The accounting rule[87] permits companies to capitalise such interest into the cost of the fixed asset,[88] but such financial costs are excluded for tax purposes. They are to be treated as an expense in the determination of taxable profit[89] and thus an adjustment to accounting profit would be required[90] if a company opted for capitalisation. However, capitalisation is rare in practice (Case IV).

Case II identity exists, for individual company accounts, in the field of inventory valuation. The governing accounting rule[91] allows either FIFO or

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[81] There are other reasons for the frequent and detailed changes in tax statute and regulation: for example, pursuit of socio-economic incentives or broader aims; political aims; control of certain kinds of avoidance activities or multinational commercial behaviour.

[82] CGI, Ann. III, art. 38 *quater*.

[83] Defined by CNC Terminology Commission as 'precise in its nature but uncertain as to its impact'.

[84] CGI, art. 39-1-2°.

[85] C. Com. art. 12; *Décret* 83-1020, art. 7; PCG *Titre* II, *Chapitre* III, Section IA.

[86] CGI, Ann. III, art. 38 *quinquies* and *nonies*.

[87] *Décret* 83-1020, art. 7-2°.

[88] A rule extended for consolidated accounts to permit capitalisation into the cost of production of a current asset: *Décret* 86-221, art. D248-8(d).

[89] CGI, Ann. III, at. 38 *quinquies*.

[90] On form N°2058-AN.

[91] C. Comm art. 12.

weighted average cost as methods of stock valuation and these methods are also those allowed for tax purposes.[92] Other situations exist where the tax/accounting identity may be said to derive from general principles. Accounting rules for individual company accounts do not permit the capitalisation of finance leases; indeed, a whole sub-section of the PCG[93] is devoted to accounting for leases which sets out the particular accounting codes to be used. There is no explicit provision in the CGI which considers the issue of capitalisation, and lease payments would thus be classified as an expense, recognised by the PCG, to be deducted in arriving at accounting and taxable profit.[94]

A more complicated relationship exists in circumstances where both accounting rules and tax rules contain options for treatment. Accounting for research and development provides one example. The accounting rules of the Commercial Code and the PCG[95] require such costs to be expensed, although exceptionally (and under certain conditions) applied research and development may be capitalised. The option provided in the Tax Code[96] is expressed slightly differently: at the choice of the enterprise, research and development costs may be either charged against profit or capitalised and then amortised. In this case the tax treatment seems to follow the accounting treatment of the expenditure (Case III). However, the possibility of a reverse effect seems equally to result: the accounting treatment may be chosen with the tax effect in view.

Another example of the complications for the tax/accounting relationship created by options in accounting treatment is accounting for long-term contracts. The accounting rules appear to admit both the completed-contract and percentage-of-completion methods, although there are caveats. According to the general rule set out in the Commercial Code,[97] only realised profits can be recognised in the annual accounts, but a 1985 amendment to the rule[98] permits the inclusion of profit taken on work completed under certain conditions. The PCG[99] has particular accounting requirements when this percentage-of-completion method is used. The tax rules are not clear in this area. The main rule[100] appears to align taxable profit on long-term contracts with the completed-contract method; there seems to be no official consideration of the percentage-of-completion

method, which would generally accelerate tax liabilities. This appears to be a Case I. However given the indeterminacy of both sets of rules, this suggests a Case IV relationship in practice.

There are other instances that more clearly illustrate Case I in that, for tax purposes, adjustments are made to the profit declared in the company's annual accounts. One example has already been mentioned: capitalisation of interest. Similar divergences exist in the treatment of foreign exchange transactions where the provision for transaction losses arising on unsettled foreign currency debtors and creditors required by the PCG[101] is disregarded under the relevant tax rule,[102] and the unsettled transaction loss itself is included in arriving at taxable profit.

Another example which illustrates the struggle for the 'nerve centres' of accounting in France is pension provisions (Mikol, 1995). The central accounting rule contained in the Commercial Code requires pension commitment totals to be included in the notes to the annual accounts. Businesses can decide to make a provision for all or some of these commitments in the balance sheet.[103] However, the relevant provision of the CGI[104] specifically forbids the deduction of provisions relating to pensions; indeed, at one stage the tax authorities sought to bar the creation of pension provisions within company accounts (Scheid and Walton, 1992:223–4). Given the current divergence of accounting and tax rules, an adjustment for tax purposes is made to accounting profit where such provisions have been created. In practice, French companies do not generally make pension provisions in their accounts (Case IV).

The accounting treatment of changes in accounting policy or the correction of errors is to absorb the changes in the current year's income.[105] The tax treatment, however, is a little more complicated. For changes in accounting policy made in accordance with accounting law by managerial decision (*décisions de gestion régulières*) it appears that tax treatment follows accounting treatment (Case III), although it should be noted that the force of the accounting principle of the permanence of accounting methods in France[106] may, in practice, restrict the possibilities for companies to change their accounting policies. For the correction of errors, the situation is a little different. The

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[92] D. adm. 4A-252 § 6.

[93] PCG, *Titre* II, *Chapitre* III, *Section* IIA4.

[94] CGI, art. 39-1.

[95] C. Com. art. D.19. PCG, *Titre* II, *Chapitre* III, *Section* IA (Code 203).

[96] CGI, art. 236-1.

[97] C. Com. art. 15.

[98] L85-31.

[99] PCG, *Titre* II, *Chapitre* III, *Section* IIB4.

[100] CGI, art. 38-2-*bis*.

[101] PCG, *Titre* II, *Chapitre* I, *Section* IC. The loss is shown in the balance sheet as an 'asset'.

[102] CGI, art. 38-4. Table 2058-A requires cancellation of the provision and substitution of the unsettled loss.

[103] C. com. art. 9, modified by L85-695.

[104] CGI, art. 39-1-5°.

[105] C. Com. art. 13; PCG, *Titre* II, *Chapitre* 1, *Section* II. A recent CNC opinion (June 1997) has suggested that such changes and corrections should be treated as a prior period adjustment.

[106] C. com. art. 11.

impact of such corrections upon accounting profit must be eliminated in arriving at taxable profit (Case I);[107] adjustments would be made to earlier years' assessments.

For the most part the above discussion has focused on the tax/accounting relationship in French individual company accounts. However, a different kind of relationship exists for consolidated accounts. Statutory requirements for the publication of consolidated accounts only arrived in France with the enactment of the EU Seventh Directive—much later than in the UK or Germany. Although the French tax system has special tax *régimes* available for groups (e.g. *régime de l'integration fiscale*) the constitution of these groups is different from the requirements for the establishment of consolidated accounts. The French legislation enacting the Seventh Directive[108] took the opportunity to permit a flexibility of accounting rules for consolidation which removed the intimate tax/accounting relationship required for individual company accounts, and recognised the benefits for large multinational French companies of having internationally-comparable consolidated financial reports (*Gardes des Sceaux*, quoted by Corre, 1987:47).

Individual company accounts prepared according to the rules and definitions of the PCG, not consolidated accounts, are the starting point for the calculation of taxable profit. This flexibility and 'international orientation' are possible because no tax implications flow from consolidation for financial reporting purposes. Disconnections possible under the legislation are several:

(i)   tangible fixed assets and inventories may be valued at replacement cost;
(ii)   inventories may be valued using the LIFO method;
(iii) capitalised interest may be included in the cost of current assets under construction;
(iv)   finance leases may be capitalised;[109] and
(v)   unsettled gains on foreign currency monetary balances may be recognised as income.

In addition, the legislation requires the elimination of the effect of fiscal intrusions into the preparation of company annual accounts (specifically, in connection with investment grants, regulatory provisions and depreciation).[110] In practice, a number of large French groups do take advantage of these specific disconnections in order to move their groups accounts approximately or completely in accordance with US rules or international accounting standards (Cauvin Angleys Saint-Pierre, 1996:177–182).

In summary, there are many examples of strong tax influences upon accounting for individual companies in France, but these influences can be substantially modified in the construction of consolidated financial reports.

3.4. Germany

As noted in the introduction, the context of this paper is largely the statutory annual accounts of individual tax-paying companies. For Germany, as for France, special comments for consolidated financial statements are relevant, and these are made at the end of this section.

The formal relationship between German tax and accounting rules is that the former rest on the latter (Ordelheide and Pfaff, 1994:81). There are many instances of this Case III conformity: for example, sales, wages, interest payments, research and development costs, and the compulsory accrual for repairs in the first three months of the following year.[111] Another example of Case III is the tax treatment of changes in accounting policy and the correction of fundamental errors. This follows the accounting treatment, which is to absorb the changes in the year's income. This conforms to the *Handelsgesetzbuch* (HGB) principle[112] that the opening balance sheet should be last year's closing balance sheet. In some arenas (e.g. long-term contracts and foreign currency transactions), the accounting rule is derived from the principles of the HGB, and then Case III follows.

However, it is also easy to find instances of Cases IV and V, where accounting practice chooses to follow tax rules for various reasons:

(a)   for simplicity, in order to have a unified tax and accounting statements (*Einheitsbilanz*);
(b)   for simplicity, to reduce the differences between the tax and accounting statements;
(c)   following an option in the HGB, in order to gain tax relief;
(d)   following a tax rule in the absence of other rules, in order to gain tax relief; or
(e)   breaking *Grundsätze ordnungsmässiger Buchführung* (GoB),[113] with the permission of the HGB, in order to gain tax relief.

Areas of practice illustrating types (a) and (b) above include asset and liability recognition options in the HGB where there is no option for tax purposes. These accounting options might be considered as examples of 'disconnections', except that in practice most German companies choose to fall under (a) and nearly all the rest choose to fall under (b) for their individual company ac-

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[107] C.E. 17 *mai* 1982, n°23559.

[108] *Loi* 85-11, *Décret* 86-221.

[109] *Décret* 86-221, art. D248-8.

[110] *Décret* 86-221, art. D248-6(c). This specific mention in legislation of the need to correct tax intrusions into consolidated accounts reflects the provisions of Article 29(5) of the EC Seventh Directive.

[111] HGB § 249(1).

[112] HGB § 252(1)1.

[113] Principles of proper accounting.

counts. In more detail, decisions of the highest tax court, the *Bundesfinanzhof* (BFH) (in 1969) hold that various HGB options to capitalise assets must be taken for tax purposes and various options for the recognition of liabilities must not be. An example of the former is discount on a debt,[114] which must be capitalised for tax purposes. An example of the latter is accruals for repairs to be carried out between three and 12 months after the year end,[115] which cannot be recognised for tax purposes. An exception to the asset rule relates to business start-up expenses, which must be expenses for tax purposes and are therefore generally treated as expenses for accounting purposes, although they do not have to be.[116]

Similarly, in practice, many companies adhere to the tax rules for financial reporting purposes in the following areas:

(i)   use of the tax law's 15-year write-off period for non-consolidation purchased goodwill, rather than the four-year period found in commercial rules (unless a longer period can be justified);[117]

(ii) the tax law's maximum rate of 30% for declining balance depreciation is in practice not usually exceeded for accounting purposes;

(iii) the use of inventory flow assumptions (e.g. average cost, FIFO or LIFO)[118] generally coincide for tax and accounting, although they do not have to;[119]

(iv) the accounting option to include production overheads[120] is generally taken up following the tax requirement to include them;

(v)   the accounting option to provide for pension commitments relating to the period before 1987 is generally not taken up; and

(vi) the tax decrees of the Ministry of Finance are followed for determining if a lease should be capitalised (Ordelheide and Pfaff, 1994:124).

An example of type (c) (following an HGB option in order to get tax relief) is the writing down of an asset below cost.[121]

Examples of type (d) (following a tax option in the absence of other rules, in order to get tax relief) include the common accounting practices of:

(i)   the use of maximum depreciation rates allowed by tax law;

(ii) changing depreciation method[122] from reducing balance to straight-line for an asset when this would increase the expense;

(iii) expensing items that cost less than DM800;[123]

(iv) charging six months' depreciation on assets bought in the first half of the year and a full year's depreciation on assets bought in the second half;[124]

(v)   discounting of non-interest-bearing long-term debtors;

(vi) calculation of pension expenses on the basis of interest rates and other assumptions in tax rules (Seckler, 1992: 238–9); and

(vii) taking federal grants to income immediately because they are not taxable, whereas other grants are deducted from the related assets and therefore taken to income (and taxable income) more slowly.

Examples of type (e) (breaking GoB in order to gain tax relief) include:

(i)   the lack of re-instatement of historical cost[125] even when a previous write-down is no longer necessary; and

(ii) using accelerated depreciation as allowed for certain assets or in certain regions.[126]

In terms of the five cases, types (a) to (d) seem to be examples of Case IV (tax rules followed instead of other acceptable financial reporting rules). However, type (e), although 'voluntary', seems to be an example of Case V (tax rule followed instead of a conflicting financial reporting rule). One could argue that the arena of lease accounting (as noted above) is another example of Case V. The HGB is unclear but the decrees of the Ministry of Finance are followed rather than the guidance of the *Institut der Wirtschaftsprüfer*. However, classification as Case V would rely on treating the *Institut's* guidance as an accounting 'rule' which may be inappropriate. Therefore, we retain the Case IV classification.

By contrast, there are some specific disconnections between German accounting and tax rules where practice actually does diverge (Case I). These might be split into those instances where practice *sometimes* diverges and those where it *must*. The examples of types (a) to (e) above are not included here because practice tends not to diverge. However, an example where it sometimes

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[114] HGB § 250(3).
[115] HGB § 249(1).
[116] HGB § 269.
[117] EStG § 7(1) as opposed to HGB § 255(4).
[118] HGB § 240(4) and § 256.
[119] Brooks and Mertin (1993: E13) suggest that, when prices rise, companies might use average cost for tax purposes and FIFO for financial reporting.
[120] HGB § 255(2).
[121] Allowed by HGB § 253(2) and EStG § 6.

[122] Incidentally, the BFH held in 1990 that conformity between tax and accounting was required for the method of depreciation, not merely the amount (BStBl, 1990 s. 681).
[123] See § 6, para. 2 of EStG.
[124] Art. 44, para. 2, *Einkommensteuer-Richtlinien*.
[125] With the permission of HGB § 280.
[126]There is an option to show the credit entry for this not against the asset but in a special balance sheet caption called *Sonderposten mit Rücklageanteil*, which might be interpreted as partly reserves and partly deferred tax.

does diverge is where a company feels obliged to make certain provisions which are not sufficiently concrete to be deductible for tax purposes. Instances where tax and accounting *must* diverge include expenses which are not tax deductible, including (i) certain fines, (ii) 20% of entertainment expenses, (iii) charitable and political donations above certain maxima, and (iv) half the fees of members of the supervisory board.

In summary, there are many examples of the influence of tax on accounting in Germany. However, some large companies choose to use different accounting policies in their consolidated financial statements in order to reduce this influence. Major examples of this are the annual reports of Bayer and Schering for 1994 onwards, where International Accounting Standards (IASs) have been followed by choosing appropriate options from the HGB. Other companies (e.g. Hoechst) have subsequently adopted this practice for 1995 onwards. A further development is that Deutsche Bank used IASs for a supplementary set of group accounts for 1995, and Daimler-Benz used US rules for a supplementary set in 1996.

Clearly, the choice of accounting policies for the group accounts of certain large German companies is driven by factors which override the influence of taxation. However, in some cases, these effects are seen particularly in non-statutory supplementary accounts (e.g. Deutsche Bank, Daimler-Benz) and, in other cases, the effects are not typical of German accounting in general (e.g. Bayer, Hoechst). As in the case of France, these effects are only apparent in the group accounts of certain large companies, although (at the time of writing)[127] there is no formal mechanism in Germany for the use of different rules.

4. Comparative analysis

In the opening section of this paper we set ourselves the task of investigating the claim that there is a clear distinction between Anglo-Saxon countries and some continental European countries with respect to the degree of connection between taxation and financial reporting. In this final section, we summarise our comparative analyses of the degree of linkage between tax rules and financial reporting in our four countries, and suggest some ways in which our analysis could be applied and extended.

Cases I and II have been defined as those where tax rules or considerations do not determine financial reporting practice in the sense of accounting

policy choices by managers. The Cases are distinguishable in that Case I involves different tax and financial reporting practices whereas Case II involves the same practices. Case III (accounting leads) is less clear. Where the financial reporting rule is precise, there may be little room for tax influence, but where there is vagueness or an option, then tax considerations may dominate. Cases IV and V involve clearer tax prominence. Table 3 summarises by country the distinct Cases of linkage previously reported in detail in Table 2. There are, of course, other areas of accounting where all four countries would score III. For example, the German requirement for *Massgeblichkeit* means that Case III applies in principle.

In Table 3 we see relatively numerous Case I disconnections between tax and financial reporting in the UK and the US, and relatively numerous Case IV and Case V relationships for Germany. The suggestion is clear that the influence of tax on operational accounting policy choice is least in the UK and the US and greatest in Germany, with France in between. This is supported by more Cases II and fewer Cases III for the UK and the US than for Germany. If the uncertainty of Case III is addressed by adding it to Cases IV and V, then the conclusion remains the same. Of course, the scoring in Table 3 assumes an equal weight for the 18 arenas or sub-arenas, and rests upon the particular arenas chosen. However, inspection reveals that assigning any other reasonable weightings would make little difference to the order of countries. Further, as noted above, adding more arenas would generally add more Cases III rather than more Cases I, IV or V, which are the clearest arenas of international variation. This assessment has been made at a particular point in time. Variations in the assessment over time could also be measured.

In summary, it is possible to distinguish our two Anglo-Saxon countries from our two continental European countries on the grounds of relatively low and relatively high tax influence on financial reporting in a contemporary operational sense. Consequently, we find some support for the hypothesis that it is possible to distinguish 'Anglo-Saxon' from 'continental European' countries according to the relative strength of tax influence on accounting policy choice. However, France, too may be clearly distinguished from Germany, and US and UK patterns of influence may be distinguished from one another.

This distinct modelling of tax-accounting interrelations—'Anglo-Saxon' and 'continental European'—is also in concurrence with a number of German and French commentators (e.g. Quéré, 1994:71; Haller, 1992:321; Gélard, 1990:15), that German accounting is especially tax-influenced. However, the recognition of such models should not be allowed to obscure the complex pattern of

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[127] In 1996, draft laws were in preparation in both Germany and France to allow the group accounts of certain companies to depart from national laws in order to follow other approved rules (e.g. US or IASC principles). In early 1998, laws were passed in both cases.

reciprocal influence between taxation practice and financial reporting practice in all four countries studied. In Section 3, we noted some examples of the changes in the relationship between tax and accounting practice over time. More examples are given in a paper which concentrates on this historical relationship (Lamb et al., 1995). More generally, focus on national models draws attention away from the richness and variety of changing patterns of tax influence.[128] Despite this caveat and the shifting nature of the relationships in the various countries, a stable pattern seems to be clear in each country and therefore comparatively.

The main change in the pattern relates to group accounting in France and Germany. Table 3 does not record the more complex position for group accounting in France and Germany. In both countries, the law allows group accounts to use different accounting policies from those used by the parent. Further, the previous section records how French law allows specific changes from individual company accounting to consolidated accounting. As a result there have been examples in France over many years of reduction of tax influence in group accounts.[129] Such an approach is clear for a few German companies from the mid-1990s.

One policy implication arising from our studies is that accounting harmonisation efforts in the world or in the EU would be more likely to succeed if focused on group accounts (cf. FEE, 1993 and Biener, 1995). The deeply entrenched links between tax and accounting and the large number of Case IV and V arenas in certain countries seem to

make harmonisation more difficult for individual company accounts.

In conclusion, we suggest that it may be more fruitful to compare systems of financial accounting according to the reciprocal patterns of influence and interrelations between tax and accounting, rather than to label such systems according to national, and to some extent out-of-date, stereotypes. One thing that we have clearly observed is that the degree and nature of tax influence on accounting changes over time, as do international patterns of similarity and dissimilarity. The assessment method adopted in our analysis of the influence of taxation on accounting could be used in a historical context 'to trace patterns of divergence and convergence over time' (Roberts, 1995) and to better link 'cross-temporal and cross-spatial variance' in accounting practices (Christiansen and McLeay, 1995:7). The extension of our approach to a wider range of countries could, of course, increase the richness of the comparative analysis.

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[128]Further, undue focus on models defined by reference to nations may obscure important patterns of international diffusion of practices. Christiansen and McLeay (1995: 7) argue that 'the central problem of comparative research [is] linking cross-temporal and cross-spatial variance'; 'encompassing comparisons' that allow comparative research to escape being the 'prisoner of the state' are likely to be most appropriate in their view.

[129] The survey of the practices of large French groups illustrates this. See Cauvin Angleys Saint-Pierre (1996).

Table 3
Cases of linkage in certain material arenas of financing reporting for individual companies

	UK	US	France	Germany
Case I	12	11.5	4.5	2
Case II	2	2.5	5	0
Case III	3	2	3.5	7.5
Case IV	0	1	4	6.5
Case V	0	0	1	2
N/A	1	1	0	0

Note: Each of the 18 arenas or sub-arenas is weighted as one. Therefore, the total for each country should, and does, equal 18

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Profit Measurement and UK Accounting Standards: A Case of Increasing Disharmony in Relation to US GAAP and IASs

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Abstract—UK accounting practice differs from International Accounting Standards (IASs) particularly with regard to amortisation of goodwill, provision for deferred taxation and the accounting treatment of pension costs. Under the core standards programme of the IASC the IASs have emerged closer to US practice. This paper evaluates the profit of those UK companies reporting to the Securities and Exchange Commission (SEC) in 1988 and 1994, spanning a period which saw the establishment of the ASB and the implementation of the IASC's comparability project. An increasing gap was found between the reported profit under UK accounting principles and that restated under US GAAP. The difference lay most frequently in accounting for goodwill, provision for deferred tax, and the accounting treatment of pension costs, with accounting for goodwill showing a particularly significant impact in 1994. Notwithstanding the introduction of FRS 10, an overall impression of increasing disharmony could continue to cause reconciliations to be required of UK companies seeking full listing on a US stock exchange, with consequent disadvantage relative to companies in other European countries seeking international capital in the US.

1. Introduction

A practical instance of the demand for harmonisation of accounting practices has been provided in the consultation between the International Accounting Standards Committee (IASC) and the International Organisation of Securities Commissions (IOSCO). This has resulted in a target of revising the priority standards to IOSCO satisfaction by mid-1998, a project commonly referred to as 'the core standards programme' (IASC 1993a: 4). The divergence between UK accounting practice and International Accounting Standards (IASs) is noted in a number of areas (Keegan and King, 1996) but particularly with regard to the amortisation of goodwill, accounting for deferred taxation and the accounting treatment of pension costs and employee benefits.

A key element to gaining acceptance of the IASC core standards by IOSCO is participation by the US Securities and Exchange Commission (SEC), as a member body of IOSCO (IASC 1996b). The SEC imposes strict accounting requirements on foreign companies seeking a full listing on a US stock exchange. In particular, the SEC requires a report on form 20-F, a lengthy document which, in the case of UK companies as foreign registrants, includes a reconciliation of profit reported under UK accounting principles[1] to the profit figure which would have been reported under US GAAP. If in future the SEC accepts financial statements prepared under IASs then reconciliations will no longer be required where IASs are applied in full. However, if UK accounting standards remain different from IASs, there may well be a continuing requirement for reconciliations to be reported by UK companies while other companies enjoy exemption because they apply IASs in full.

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[1] This paper avoids the abbreviation 'UK GAAP' which is more broadly expressed as the all-encompassing 'generally accepted accounting principles' mentioned in UK company law (Companies Act 1985 s262 (3) and Coopers and Lybrand 1988: 2001) but which has been espoused as 'generally accepted accounting practice' in a popular text from the firm of Ernst & Young (Davies et al, 1997).

In this context it is relevant to investigate the materiality of the differences in reported profit, as perceived by the US reader, of the profit and loss account stated under both US GAAP and UK accounting principles. Information is deemed to be material if it could influence users' decisions taken on the basis of the financial statements (ASB 1995: para. 2.7). The relative materiality of adjustments, indicated by this research, provides a benchmark against which to assess the likely impact of a continuing requirement to prepare reconciliations where there is a lack of compatibility with IASs. It is also relevant to consider relative magnitudes of material differences over the period in the early 1990s during which UK standards were being set under a new regime and the IASC was revising its standards.

A direct question regarding the future impact of non-compliance with IASs would be to seek quantification of *de facto* differences between profit reported under UK accounting principles and that reported under IASs. As UK companies do not provide such reconciliations, that would require a simulation or a speculative recalculation using information in the public domain. The reconciliations contained in form 20-F allow quantification of *de facto* differences between UK practices and US GAAP. The impact of UK practices which depart from IASs may be derived by comparing details of the various regulations.

Accordingly, the questions addressed in the paper are:

• what were the *de jure* differences between measurement practices under UK accounting principles as compared to those under US GAAP, during the period 1988 to 1994?

• what were the *de facto* differences in reported profits under UK accounting principles and US GAAP in 1988 and 1994, and what were the relative magnitudes of those differences?

• what implications do the quantified differences have for policy makers in setting UK standards, with particular regard to alignment with the IASs?

This paper evaluates the differences in profit measurement arising from reporting under both UK accounting principles and US GAAP at two points in time, namely 1988 and 1994. These dates have been chosen because the intervening period encompasses the change from the Accounting Standards Committee (ASC) to the Accounting Standards Board (ASB) in the UK and the implementation of the IASC's comparability project, but it predates the start of the IASC's core standards project. The paper estimates the extent to which the reported differences would remain if the core standards were accepted by the SEC but, at the same time, some UK standards were not aligned with the core standards. The paper also offers an evaluation of the extent of differences in

reported profit during the early years of operation of the ASB.

Previous research analysing reports on form 20-F issued by companies, prior to the start of the IASC's comparability project (Weetman and Gray 1991), showed substantial differences when profit reported under UK accounting principles was compared with that under US GAAP. Since that time the pressures for international harmonisation have grown, most importantly across the major capital markets of the world. It is a matter for continuing debate as to whether investors can cope with accounting diversity. Choi and Levich (1991), interviewing stock market participants in the UK, US, Japan, Switzerland and Germany, found that about half the respondents felt that accounting diversity affected their decisions. Bhushan and Lessard (1992) found that, among US and UK-based international investment managers, uniform disclosure or harmonisation was seen as more important than quantitative reconciliation to US GAAP.

The purpose of this paper is to explore the extent to which there is greater or lesser diversity due to differences in reported profit as a result of differences between UK accounting principles and US GAAP. The next section draws on prior literature for factors creating pressure for international harmonisation of the paper. There follows in Section 3 a brief analysis of *de jure* differences in comparisons of UK accounting principles with US GAAP and with IASs. *De facto* differences between accounting practices under UK accounting principles and US GAAP are quantified using the 'index of comparability' measure described in Section 4 and applied to the sample as outlined in Section 5. The results are discussed in some detail in Section 6. Section 7 draws conclusions regarding the quantified differences and the policy implications.

2. Pressures for international harmonisation

International pressures for improvement in the comparability of accounting and information disclosure arise from the diverse interests and concerns of a wide range of participant groups and organisations around the world. Since the early 1970s, when the IASC was established, these pressures have grown at a rapid pace along with the development of stock markets internationally and especially those in emerging economies (IASC 1996b). While IASs issued during the 1970s and 1980s were recognised to have made a contribution towards international harmonisation, by the late 1980s the performance of the IASC was increasingly being questioned on account of the flexibility

of the standards and continuing lack of comparability of financial statements across borders.

2.1. Involvement of IOSCO

An important development at this time was the interest of the IOSCO in the IASC's provision of mutually acceptable international accounting standards for use in multinational company security offerings and listings. IASC invited IOSCO to join its consultative group in 1987 (Wallace, 1990: 18–19). In 1988 a report of the Technical Committee of IOSCO concluded that differences in national accounting requirements presented a major impediment to multinational securities offerings and other foreign listings. The IASC and IOSCO agreed to work together to find a solution that would allow a company to list its securities in any foreign stock market on the basis of one set of financial statements conforming to IASs (Cairns, 1995: 57). The IASC responded in 1989 with the comparability project set out in the exposure draft E 32 *Comparability of Financial Statements* (IASC 1989). The proposals in E 32 were designed to eliminate most of the choices of accounting treatment then permitted under International Accounting Standards. IOSCO indicated that being seen to adopt a more uniform approach, as E 32 advocated, would enhance the credibility and acceptability of IASs by the international investment community.

The outcome of the comparability project proposals, refined by the *Statement of Intent* (IASC 1993b), was that 10 IASs were revised. These revisions included the elimination of some 20 permitted accounting treatments. Of relevance to this paper were the elimination of: the use of closing exchange rates when translating income statements; the expensing of development costs where specified criteria were met; and the immediate write-off to shareholders' interests of positive goodwill.

Subsequent to completion of the IASC's comparability project, IOSCO indicated that more work would be required (Cairns, 1995: 41) and presented a list of core standards which it might be willing to accept provided the full programme of core standards could be completed successfully within a specified limit of time (IASC 1994: 13). In 1995 the Technical Committee of IOSCO agreed that successful completion of the IASC's work plan by the end of 1999 would mean that IASs would form a comprehensive set of core standards. The Technical Committee would then be in a position to recommend endorsement of IASs for cross-border raising of capital and for listings in stock markets around the world. At the urging of multinational companies and members of IOSCO, the Board of IASC brought forward the target date to March 1998 (IASC 1996a:1, 9–12).

2.2. US approach to IASs

A key player in the success of the IASC endeavour is the US. Both the SEC and the Financial Accounting Standards Board (FASB) have expressed support for the objectives of the IASC's core standards programme. However, they have qualified this by stating that acceptance is dependent on IAS's constituting a comprehensive set of generally accepted accounting principles. The standards must also be of high quality and be rigorously interpreted and applied. The chairman of the FASB has been critical of the speed with which the IASC has carried out the core standards programme, questioning whether this is compatible with high quality standards (IASC 1996b). The FASB has also identified more than 250 differences between IASs and FASB standards (FASB 1996, IASC 1996b). The IASC has pointed out that not all these differences relate to the core standards identified as priority matters but has confirmed that it will refer to the FASB's analysis as these standards are developed (IASC 1996b).

2.3. UK approach to IASs

Since 1990 the ASB, working within the European Directives, has refined and extended UK financial reporting requirements in ways which, in some measurement respects, have moved UK practice towards that of the US. At the same time measurement practices in the US have been developing further. Some of the most difficult and internationally contentious issues have only recently begun to be tackled by the ASB. In particular there are the issues of accounting for goodwill, deferred taxation and pension costs. This paper shows that in 1994 these remained the most frequent causes of reported difference in profit between UK accounting principles and US GAAP. By the end of 1994 Financial Reporting Standards (FRSs) numbers one to six were in operation as mandatory requirements.

The chairman of the ASB has articulated the fear that if the IASC did not deliver the core standards within the agreed time scale then companies seeking US funding would switch to US GAAP and would probably not be interested thereafter in further changing to IASC standards (FRC 1996). Three possible strategies have been analysed by the chairman as a basis for reacting to the mounting pressure for harmonisation:

• adopt international standards for domestic purposes;

• develop domestic requirements without regard to international standards; or

• harmonise domestic requirements with international standards where possible.

Analysis of limitations and benefits lent support to the third of these and to the view that the ASB

should depart from international consensus only when:

- there were particular legal or fiscal problems that dictated such a course; or
- the Board genuinely believed that the international approach was wrong and that an independent UK standard might point the way to an eventual improvement in international practice.

It was noted that the ASB had taken an independent course with regard to accounting for goodwill, and indicated the need for debate on accounting for deferred tax and accounting for pension costs (FRC, 1996: 42–46). This paper offers a contribution to that debate.

3. UK/US/IAS accounting differences

Accounting differences may be classified *de jure* by examining the regulations, or *de facto* by examining the practice.

3.1. De jure differences

Measurement practices of UK accounting which are not compatible with those of US GAAP are listed in Table 1. Panel (a) of Table 1 indicates the UK measurement practices which differ from both US GAAP and IASs. Panel (b) of Table 1 indicates the UK measurement practices which differ from US GAAP but are compatible with those of the IASs.

We provide later an evaluation of the UK/US differences in reported profit arising in total and for each item of Table 1 separately. If in future the SEC accepts financial statements prepared under IASs then, in principle, reconciliations will no longer be required of any company reporting under IASs. If, however, UK accounting standards remain different from IASs, there may well be a continuing requirement for reconciliations to be reported by UK companies in respect of those items in panel (a) of Table 1 (with the possible exception of accounting for goodwill under the new UK standard on intangibles). However the items in panel (b) of Table 1 would probably no longer be required.

An important change during the period which brought UK accounting closer to US GAAP was in respect of reporting extraordinary items, common in 1988 but virtually non-existent in 1994 as a result of the implementation of FRS 3 *Reporting financial performance* (ASB 1992a). Other evidence of movement towards US GAAP may be seen in aspects of UITF 6 *Accounting for post-retirement benefits other than pensions* (ASB 1992b) and in FRS 4 *Capital instruments* (ASB 1993), FRS 5 *Reporting the substances of transactions* (ASB 1994a) and FRS 6 *Acquisitions and mergers* (ASB 1994b). However, the US regulations on all these matters are more detailed. Situations remain where the UK

practice under the new standards may not satisfy the US requirements entirely.

While these UK changes were bringing UK practices closer to US GAAP, new and amended US standards were widening the gap. In particular, the accounting treatment of deferred taxation was finally agreed in the form of SFAS 109; further SFASs appeared in relation to specific aspects of financial instruments; EITF guidance was issued on restructuring costs; and SFAS 115 provided a stricter approach to investments in marketable equity securities and debt securities.

Overall, from the detailed comparisons contained in Appendix A, it would appear that there was no significant *de jure* harmonisation of accounting measurement practices between UK accounting principles and US GAAP over the period 1988 to 1994 in the main areas of difference in policy and practice.

Analysis of differences in legislation gives no indication of how frequently such differences will be encountered in practice or how significant the differences may be in their impact on profit. The next section of the paper turns to the empirical evidence based on UK companies which report under US GAAP as well as under UK accounting principles.

3.2. De facto differences

De facto differences in UK and US accounting practices over the period 1986–1988 inclusive were analysed by Weetman and Gray (1991) using the reports of UK companies to the SEC on form 20-F. The availability of such data is confined to those UK companies which have a full listing on a US stock exchange. The advantage of the data lies in the detail of the reconciliation and the quality, being audited information prepared by the company. From a research perspective, each company provides a 'matched' set of data showing how the company's reported profit compares under each set of GAAP. This paper extends that matching by taking companies whose accounting information was available in both 1988 and 1994 (Appendix B).

4. The index of comparability as an indicator of harmonisation

Gray (1980) first used the 'index of conservatism' in comparing profit measurement practices of several countries. However, for the purposes of this paper, renaming the index as a measure of 'comparability' places clearer emphasis on relative accounting treatment without requiring a judgment as to which is more or less conservative. The index of comparability indicates the measurement impact of accounting differences and may therefore be distinguished from other indicators of harmon-

Table 1
Incompatibility of UK measurement practices with US GAAP and relation to IASs

(a) Measurement practices where UK is not compatible with either US GAAP or IAS

Goodwill	UK SSAP 22 not compatible with either IAS 22 or US GAAP
Deferred taxation	UK SSAP 15 (revised) not compatible with either IAS 12 or US GAAP
Pension costs and post-retirement benefits other than pensions	SSAP 24 is not currently compatible with US GAAP and will not be compatible with the revised IAS (1998) which is closer to US GAAP
Capitalisation of development costs	SSAP 13 is permissive on capitalisation of development costs; IAS 21 is closer to US GAAP in prescribing conditions for capitalisation
Financial instruments	FRS 4 prohibits split accounting for mixed capital instruments
Consolidation policy	FRS 2 leaves little scope for exclusion of a subsidiary. IAS 27 allows exclusion. US definition of control is close to that of UK
Discontinued operations	FRS 3 differs from US definition. IAS policy remains under consideration

(b) Measurement practices where UK differs from US GAAP but is compatible with IAS

Valuation of property, plant and equipment	UK compatible with IAS 16. US GAAP does not permit revaluation
Borrowing costs	UK compatible with IAS 23. US GAAP has more specific rules
Foreign currency translation	UK compatible with IAS 21 where UK companies choose average rate for translating P&L account, but not compatible with US GAAP
Dividends payable	Dividends proposed may be accrued in UK or under IASs, not under US GAAP
Correction of fundamental errors resulting from accounting policy change	UK compatible with IAS 8 on fundamental errors; US GAAP requires effect of change in profit and loss account
Business combinations	UK compatible with IAS 22. US GAAP under APB 16 dictates that pooling of interest must be used where specific conditions are met. These conditions are not identical to those of FRS 6
Restructuring costs	Not dealt with in either UK standards or IAS. US GAAP has specific requirements
Revenue recognition	UK meets IAS 18 principles. US GAAP has more specific rules
Investments in marketable equity securities and debt securities	SSAP 19 consistent with IAS 25. US GAAP uses different classifications

(Sources: See Appendix A)

isation, such as H, I or C indices which quantify the incidence of accounting differences (van der Tas, 1988).

Gray's index has featured in a number of studies of comparative reported profit (Weetman and Gray 1990 and 1991, Adams et al, 1993, Cooke, 1993, Hellman, 1993, Weetman et al, 1993, Norton, 1995).

4.1. Formula for the index of comparability

Where UK reported profit is being compared to that reported under US GAAP, the index may be expressed by the formula:

$$1 - \left(\frac{\text{Profits}_{USA} - \text{Profits}_{UK}}{|\text{Profits}_{USA}|} \right)$$

The measure of profit used is the earnings for ordinary shareholders, after tax and after extraordinary items. The numerical value of the profit or loss in the US is chosen as the denominator because the reconciliation is a report addressed to investors who, it may be assumed, are accustomed to US GAAP and consequently will view the differences as departures from US profit or loss rather than departures from UK profit or loss. The use of US profit in the denominator also allows the index values to be used in inter-country comparisons. Profit is chosen for the denominator rather than a scale factor such as sales or market value, because the paper seeks to evaluate materiality as defined earlier.

Although there is no agreed guidance on materiality, auditors assessing materiality in relation to impact on users will make reference in their work to percentages. Audit practice (Grant Thornton,

1990, para 7.59) indicates a helpful guideline as being 5–10% of profit before taxation, and warns that a judgment based on turnover would not be appropriate in relation to, say, stock valuation. There is also a warning (para 7.63) that items should not be judged material by reasons of value where a small profit is turned into a small loss, or vice versa. This study provides information based on bands at 5% and 10% of profit.

The neutral value of 1.0 is used for consistency with prior literature. An index value greater than 1 means that the UK reported profit is greater than that reported under US GAAP (or a UK loss is not as large as a US loss). An index value less than 1 means that the UK reported profit is less than that reported under US GAAP (or a UK loss is larger than a US loss).

Because the reconciliations reported to the SEC contain considerable detail, it is also possible to present partial index values using the formula:

$$1 - \left(\frac{\text{partial adjustment}}{|\text{Profits}_{USA}|} \right)$$

These provide a relative measure of the contribution of each reconciling item. The neutral value is retained as 1.0 for consistency of interpretation. The indexes of partial adjustments add to the total index by the formula:

$$\text{Total index} = \sum_{1}^{n} adjustment_n - (n\text{-}1)$$

4.2. Evaluation of the use of the index

It should be noted that the formula carries a disadvantage of reporting extreme index values if the US profit or loss is close to zero. Such occurrences are relatively rare in the data examined and do not seriously inhibit interpretation. The presence of such outliers has to be weighed against the attractiveness of the formula in having parallels in the accounting concept of 'materiality' which is usually judged in relation to profit. Such outliers cause comparable problems in practical interpretation of their impact on users of financial statements, and it has been suggested that materiality may not be judged on a relative value basis when profit is small or the item causes a change from a small profit to a small loss (Grant Thornton, 1990).

Use of the index to evaluate annual data may carry the risk of including in any particular year a short-term timing difference which reverses in the following year due to a difference in recognition criteria. An example might be a provision for a loss, where the timing of loss recognition follows different GAAP rules but the amount of the an-

ticipated loss is the same under both systems. Each form 20-F gives scope for consideration of this aspect because it carries not only the results of the current year but also those of each of the two previous years for comparison. Scrutiny of the three-year comparisons within each 20-F reconciliation showed that only two specific reversals in reconciling items were observable in all the separate adjustments analysed.

As a further check, the data available over three years within each 20-F was aggregated in an attempt to provide a three-year total which would eliminate the potential influence of short-term reversals. The three-year aggregation indicated little evidence of matching items being eliminated in one year against another. It is not reported here in detail because there are difficulties in interpreting aggregation of a current year's profit with comparative data of previous periods. In particular, where a large adjusting item appears in one accounting period, with no reported figure for that line item in the other two years, aggregation of profit over the three-year period will effectively apply income smoothing to that item, leading to conclusions which would not be compatible with the principles of UK and US accounting. Furthermore, where there is a positive adjustment in one year and a negative adjustment in another year, these not being reversals of the same item, the resulting cancellation will again lead to misinterpretation of the significance of those reconciling items for reported annual profit.

One justification for concentrating on the annual result only is that this is the common practice of those who evaluate accounting information. Comments in analysts' reports and the press are largely based on annual results. The general consistency of results from one year to the next over a three-year analysis was shown previously for data in the 1980s (Weetman and Gray, 1991). In the course of the current analysis it was noted that, both at 1988 and 1994, a comparable number of adjusting items was reported for each of the two previous years, as compared with those reported for the current year at the date of the 20-F. This suggests that any one year may be taken as representative of the frequency and magnitude of adjustments.

5. Sample

The total number of UK companies providing a 20-F reconciliation was approximately 45 in each of 1994 and 1988. (There is no authoritative list available on a systematic basis; the information is deduced from listings provided by search agencies and from such sources as the web pages of the New York Stock Exchange.) This group is a sub

set of a larger group of UK listed companies[2] (over 220 in 1994 compared with 162 reported by Weetman and Gray for 1988) whose shares are traded in the form of American Depositary Receipts (ADRs) in the US. The companies making use of the ADR facility are exempt from the 20-F filing requirement,[3] which is aimed primarily at those seeking to raise new capital on the US stock market.

Of the 41 UK companies listed in the Appendix to Weetman and Gray (1991) as reporting to the SEC in 1988, 25 reported to the SEC at December 1994, the remainder being unavailable because of intervening takeover or merger, cessation of the US listing and, in one case, a major change of activity, from manufacturing to licensing, in process during 1994 (Appendix B). In order to achieve a matching over the period of transition from Accounting Standards Committee to Accounting Standards Board, only those 25 are the subject of this analysis. The benefit of having a matched sample, albeit relatively small, lies in holding constant the nature of the business over the period of comparison.

As a further check on the constancy of the nature of the business, there was scrutiny of the section of each 20-F report containing the description of the business and the main business segments. None of these companies experienced a fundamental restructuring between the two dates used for the analysis. Three of the utilities had major plans in train but these had not become operational to a significant extent at the end of 1994. All companies reported sales to US customers which were, in the main, proportionately greater in 1994 than in 1988. This group of companies was active in expanding by acquisition rather than by organic growth.

There were changes in key financial indicators (taken from the UK information available on *Datastream*). For the group as a whole, the average level of gearing was higher in 1994, the average debt to equity ratio being 34.8% in 1988 and 44.1% in 1994. A higher level of gearing might be expected where companies active in acquisition were writing off goodwill against reserves, at a rate greater than the rate of expansion of net assets.

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[2]Weetman and Gray (1991) reported 162 in 1988. The *Depositary Receipts Universal Issuance Guide* 1997, available from Citibank, indicates a doubling of the total number of depositary receipt programmes between 1988 and 1994. The listings provided by Citibank include some 220 UK companies, covering most of the FTSE 100 and other major UK companies.

[3]There are three levels of publicly traded ADR programmes. Levels One and Two expand an issuer's share base through broader distribution of existing shares, while Level Three facilitates raising capital by issuing new shares. At Level Three the issuers must comply with full SEC registration and reporting requirements for foreign registrants. (Source: Citibank, *Depositary Receipts Universal Issuance Guide 1997*).

However the average was distorted by extreme values and there were more companies by number having lower gearing in 1994. Net profit as a percentage of sales (10.0% in 1988 and 8.8% in 1994) and gross profit margin on sales (15.5% in 1988 and 13.7% in 1994) were both lower in 1994, and return on capital employed (18.7% in 1988 and 12.8% in 1994) was also lower. The gross profit margin was the only ratio showing a significant difference based on a Wilcoxon matched-pairs test. The paper does not claim to relate the impact of accounting policy differences to changes indicated by financial ratios. It is a matter for conjecture as to whether users of accounts would remember the financial condition of the company at an earlier period when noting the difference in reported profit under two different sets of accounting principles.

The years ended 31 December 1988 and 1994 are described in the paper as '1988' and '1994' for convenience. Where a company had a year-end other than 31 December, the closest year-end within six months either side was selected. Each company published a detailed quantitative reconciliation and also supporting narrative explanations of the accounting policy differences.

A technical detail relates to the number of adjustments labelled 'miscellaneous'. There was an increase in the number of items recorded in this category between 1988 and 1994. Although the average index value is closer to 1.0, reconciliations described as 'miscellaneous' or 'other' may have been a combination of larger adjustments which were offset against each other. Such items limit the refinement of the analysis of partial adjustments.

6. Results

This section presents the main causes of adjustment in the context of Table 1.

6.1. Main causes of adjustment

The numbers of reconciling adjustments made to reported profit are shown in Table 2, together with the relevant index of comparability measured as a mean and a median over the group as a whole. Each category in Table 2 represents a grouping of more than one type of adjustment or description within the category, so that the total adjustments presented by companies in their reconciliations (approximately 150 adjustments in each year) were significantly greater than the number of line items indicated in Table 2.

The overall index of comparability shows that in 1988 the adjustment to profit under UK accounting principles represented 16.8% of profit under US GAAP (index 1.1679), and by 1994 the difference had risen to 25.3% (index 1.2534). The skewness of the data is indicated by the median

Table 2
Number of companies making each category of adjustment to profit, together with mean and median index of comparability for 1988 and 1994

Nature of adjustment to profit	1988 Count	1988 Mean	1988 Median	1994 Count	1994 Mean	1994 Median
Overall	25	1.17	1.10	25	1.25	1.18
Goodwill	24	1.13	1.06	23	1.21	1.15
Deferred tax	22	1.06	1.01	23	1.00	1.00
Pensions/post-retirement benefits/ insurance	10	1.01	1.01	19	1.02	1.02
Asset/expense	14	0.98	0.99	14	1.12	1.01
Historic cost/revalued asset	13	0.95	0.98	18	0.98	0.99
Intangibles	3	1.08	1.07	5	1.34	1.06
Restructuring	—	—	—	5	0.80	0.88
Foreign currency translation	5	1.00	1.01	4	0.94	0.99
Financial instruments	2	1.26	1.26	4	0.98	1.04
Leasing	2	1.05	1.05	4	1.16	1.15
Revenue recognition	3	1.02	1.00	3	0.95	0.99
Extraordinary items	12	0.95	1.05	—	—	—
Miscellaneous	5	1.01	1.03	13	0.98	1.01

The following outliers were excluded from calculation of the mean values of profit in respect of the 1994 data:
1. ICI Group plc (Overall index of comparability and partial index of comparability for pension costs and retirement benefits)
2. WPP Group plc (Overall index of comparability and partial index of comparability for amortisation of goodwill)

values, showing corresponding adjustments of 10.1% (index 1.013) in 1988 and 18.2% (index 1.819) in 1994. There is an apparently strong indication, under either the mean or the median, that harmonisation of measurement had moved in a negative direction over the period.

From Table 2 it may be seen that at both dates under consideration, four accounting issues (amortisation of goodwill, provision for deferred taxation, pension costs and the effect of fixed asset revaluation) caused the most frequent reporting of UK/US differences. Other items in those tables confirm the *de jure* differences itemised in Appendix A but their occurrence is less frequent.

The reason for a change in the number of companies showing an adjustment in Table 2 could be:
• the accounting policy difference did not exist in that year;
• the accounting policy difference existed but did not affect the company.

It would be desirable to eliminate the second explanation by reference to the company documentation but this is only occasionally achievable because the company may use the 'miscellaneous' category or may aggregate some groups of adjustments. Notwithstanding this limitation, the initial impression from Table 2 is that the differences which existed in 1988 remained in existence in 1994, augmented by new items such as the accounting treatment of restructuring costs. The ad-

justments for pension costs in 1988 were increased in 1994 primarily because of additional adjustments for post-retirement benefits. In some cases these are identified separately but in other cases they are aggregated. The only item to disappear between the two dates was extraordinary items.

6.2. Overall materiality of adjustments

The mean and median present convenient summary data for the group as a whole, but investors are more interested in the separate companies when they make investment decisions. Accordingly the findings are presented as distributions of adjustments in bands of materiality, shown in Tables 3 to 6. Comments are made in terms of adjustment to profit but could apply equally to adjustments to net loss. The results of tests of statistical significance relating to Tables 2 to 6 are set out in Table 7.

Turning first to the overall profit, Table 3 shows the distribution according to bands of profit difference which an accountant might describe as 'immaterial' or 'material' or 'potentially material' (i.e. differences less than 5%, more than 10% and a grey area between 5% and 10%). In the majority of cases for both years, UK profit was greater than US profit, with 13 companies in 1988 and 17 companies in 1994 showing differences greater than 10%.

Intuitively, Table 3 gives the impression of significant and growing differences in reported profit due to accounting policy differences. A single-sample t-test and a Wilcoxon test (Table 7a and Table 7b) confirmed that the overall index values for both 1988 and 1994 were significantly greater than 1.0. Two large outliers in 1994 were eliminated from the calculation of the t-statistic but not from the Wilcoxon test. A nonparametric paired test on the index values, comparing 1988 and 1994, indicated that the difference was statistically significant (Table 7c). Out of 25 companies, 16 had an index value in 1994 greater than that of 1988.

The principal factors contributing to the profit differences are now analysed in detail, using the classification of causes set out in Table 1, in order to quantify more specifically the causes of the differences.

6.3. Measurement practices where UK is not compatible with IAS or US GAAP

From Panel (a) of Table 1 there were seven items where UK measurement practices differed from those of US GAAP and IASs at the relevant dates. Comparing these with Table 2 only three occurred frequently (accounting for goodwill, deferred taxation and pension costs), two were found infrequently (capitalisation of development costs and financial instruments) and the other two were

either not found (consolidation policy) or were not relevant to measurement of overall profit (discontinued operations). Accordingly the first three are presented here.

Accounting for goodwill

Table 2 reports in one line all the accounting consequences of the UK policy on accounting for goodwill being different from that of the US. This covers adjustments related to annual amortisation of goodwill and also adjustments on the sale of a business where a write-off may be necessary.

Table 4 shows the distribution of values of the partial index of comparability. The number of cases where the adjustment to UK profit was 10% or more of the value of US profit increased from 10 to 14 when comparing 1988 with 1994.

Tables 7a and 7b show that for each of the years 1988 and 1994 the index value was significantly greater than 1.0. The pairwise comparison of reported profits in 1988 and 1994 (Table 7c) showed a significant difference over the period, as would be expected intuitively from the increase in the mean and median values of the index. Of the 23 pairs examined, there were 16 companies where the partial index of comparability in 1994 was greater than in 1988, and seven companies where the partial index was less in 1994. However in the latter cases the index was relatively close to 1.0.

Table 3
Frequency table of distribution of values of index of comparability for profit

Level of materiality	Index values	1988	1994
Adjustment to UK profit is −10% or more of the amount of US profit	≤0.90	5	4
Adjustment to UK profit between −5% and −10% of the amount of US profit	0.91 - 0.94	1	1
Adjustment to UK profit within +/− 5% of US profit	0.95 - 1.04	3	2
Adjustment to UK profit is between +5% and +10% of the amount of US profit	1.05 - 1.09	3	1
Adjustment to UK profit is +10% or more of the amount of the US profit	≥1.10	13	17
Total		25	25
Range (excluding outliers): lowest value		0.65	0.75
highest value		1.79	2.76

The following outlying index values were eliminated before calculating the t-statistic presented in Table 7

Name:	Index value eliminated	Year	Cause
ICI Group plc	3.36	1994	Large pension expense adjustment
WPP Group plc	10.77	1994	Low US profit figure

Table 4
Frequency table of distribution of values of partial index of comparability for amortisation of goodwill

Level of materiality	Index values	1988	1994
Adjustment to UK profit is − 10% or more of the amount of US profit	≤0.90	0	0
Adjustment to UK profit is between − 5% and − 10% of the amount of US profit	0.91 - 0.94	0	0
Adjustment to UK profit within +/− 5% of US profit	0.95 - 1.04	12	8
Adjustment to UK profit is between +5% and +10% of the amount of US profit	1.05 - 1.09	2	1
Adjustment to UK profit is +10% or more of the amount of the US profit	≥1.10	10	14
Total		24	23
Range (excluding outliers): lowest value		1.00	0.95
highest value		1.78	2.30

The following outlying index values were eliminated before calculating the t-statistic presented in Table 7

Name:	Index value eliminated	Year	Cause
WPP Group plc	9.02	1994	Low US profit figure

The increase in the index is not a surprise given the acquisitive nature of these companies, but it does indicate that for companies active in the take-over market there will be an increasing perception of penalty related to amortisation rather than writing-off to reserves. It is possible to see, in this increasingly material impact of the effect of amortisation of goodwill, a cause for the concern expressed among UK companies when it was proposed that amortisation should become the normal practice. (Such concerns are documented in the letters of comment received by the ASB on various discussion papers relating to the subject of accounting for goodwill and intangibles.) The adjustment for intangible fixed assets, where disclosed separately, appeared less frequently. In some cases there were indications that the goodwill adjustment included an element of amortisation of other intangibles.

Accounting for deferred taxation
The frequency table showing distribution of the partial index values (Table 5) confirms a clustering around the neutral value of 1.0 in both years.

From Table 2 it may be seen that the mean value of the partial index for 1988 was 1.06. The t test (Table 7) indicated this was significant at the 5% level, but the Wilcoxon test indicated significance only at the 10% level. In 1994 the partial index was close to 1.0 and not statistically significant. The deferred taxation adjustment was the second most frequently occurring but by 1994 had become, on the average, of insignificant impact on

reported profit. From the 21 companies that permitted pairwise comparisons (Table 7c) there were 15 companies for which the index value for 1994 was less than that for 1988. Overall the decrease was significant at the 10% level but not at 5%.

Pension costs and post-retirement benefits
The frequency distribution (Table 6) confirms a clustering around the central value of 1.0. The index values for adjustments relating to pension costs and post retirement benefits ranged from 0.94 to 1.12. In 1994, excluding the outlier, the range had spread further with index values ranging from 0.72 to 1.22 and there were nine companies in the zones of plus or minus 10% or more.

Table 7a shows that even in 1994, where the costs of post-retirement benefits had an effect in addition to pension costs, the mean value of the partial index was not significantly greater than 1.0. This was confirmed by the Wilcoxon test (Table 7b). Although pension costs and post-retirement benefits are a frequent cause of difference, there is no evidence of a material quantifiable difference overall. Investors would focus interest on the relatively infrequent large adjustments.

6.4. Measurement practices where the UK differs from US GAAP but is compatible with IASs
Panel (b) of Table 1 reveals nine items where UK measurement practices differ from US GAAP but are compatible with IASs. Comparing this list with Table 2 it may be seen that the most fre-

Table 5
Frequency table of distribution of values of partial index of comparability for deferred taxation adjustments

Level of materiality	Index values	1988	1994
Adjustment to UK profit is −10% or more of the amount of US profit	≤0.90	1	5
Adjustment to UK profit is between −5% and −10% of the amount of US profit	0.91 - 0.94	1	2
Adjustment to UK profit within +/− 5% of US profit	0.95 - 1.04	12	10
Adjustment to UK profit is between +5% and +10% of the amount of US profit	1.05 - 1.09	4	2
Adjustment to UK profit is +10% or more of the amount of the US profit	≥1.10	4	4
Total		22	23
Range lowest value		0.90	0.73
highest value		1.43	1.34

quently occurring relates to valuation of tangible fixed assets. Accruing dividends payable has no impact on profit measurement and the remaining seven items are found relatively infrequently.

Valuation of property, plant and equipment (Table 2)

The additional depreciation due to asset revaluation caused UK reported profit to be lower than the US figure. There were 14 companies making this adjustment in each year. The partial index of comparability was 0.95 for 1988 and 0.98 for 1994. In neither year was the index significantly less than 1.0. The IASC permits revaluation of fixed assets as an allowed alternative. Accordingly, if the SEC were in future to accept accounting statements consistent with IASs, UK companies could continue to revalue fixed assets and yet not be required to report the difference.

Other items from Table 1, panel (b)

Compulsory capitalisation of interest under US GAAP (borrowing costs—Table 8) caused five companies to make adjustments in 1988 and six in 1994. Since the existing UK practice is compatible with the benchmark treatment of IAS 23, there would be no requirement for a reconciliation in this respect if the SEC accepted practices compatible with IASs.

In the case of foreign currency translation (Table 2), five companies made adjustments in 1998 and four in 1994. Of these, two companies at each date used the year end rate for revenues and expense. Other adjustments (three in 1988 and two in 1994) related to reversal of translation differences on disposal of a foreign currency investment. The impact was not material overall.

Restructuring as an adjustment (Table 2) appeared in 1994 but not in 1988. The five companies reporting this adjustment in 1994 showed that in all cases the UK profit was lower than the US profit because the US rule did not permit the expense which had been reported in the UK.

For revenue recognition (Table 2), the three cases encountered in each year comprised one case of the amortisation of a capital grant, when the US rule allowed a revenue item not reported in the UK, and two cases of sale and leaseback transactions when the US rule did not allow a revenue item recorded in the UK.

6.5. Items not dealt with specifically by IASs

Some adjustments between UK accounting principles and US GAAP were reported which are not covered by a specific IAS. These were lessor accounting and a collection of items related by issues of recognition as an asset or an expense. Lessor accounting differences caused two adjustments in 1988 and four adjustments in 1994. These are quite technical issues which have not yet been developed by the IASC. Table 8 summarises all situations encountered in the reconciliations where an item may be recognised as an asset in one country but as an expense in the other. Relatively few of these are covered by a specific IAS.

Three categories of recognition practice may be identified. One is that the UK reports an asset with amortisation while the US reports an expense. The second is that the UK reports an expense while the US reports an asset with amortisation. The third is that the UK reports a write-off against reserves while the US reports an asset with amortisation. What is perhaps surprising is the number of items where the US approach appears less prudent by reporting an asset and spreading the cost, rather

Table 6
Frequency table of distribution of values of partial index of comparability for pension costs and retirement benefits

Level of materiality	Index values	1988	1994
Adjustment to UK profit is −10% or more of the amount of US profit	≤0.90	0	3
Adjustment to UK profit is between −5% and −10% of the amount of US profit	0.91 - 0.94	1	1
Adjustment to UK profit within +/−5% of US profit	0.95 - 1.04	7	8
Adjustment to UK profit is between +5% and +10% of the amount of US profit	1.05 - 1.09	1	1
Adjustment to UK profit is +10% or more of the amount of the US profit	≥1.10	1	6
Total		10	19
Range (excluding outliers): lowest value		0.94	0.72
highest value		1.12	1.22

The following outlying index values were eliminated before calculating the t-statistic presented in Table 7

Name:	Index value eliminated	Year	Cause
ICI Group plc	3.07	1994	Large pension expense adjustment

than taking the approach of reporting an immediate expense. The quantified impact and direction of the adjustment depends on the date on which the expenditure was incurred. Accordingly there is no systematic direction of the quantified impact of the policy differences. The table gives some support to the proposition that income smoothing is a stronger feature of US accounting.

7. Summary and conclusions

Three questions were asked at the start of the paper:
• What were the *de jure* differences between measurement practices under UK accounting principles as compared to those under US GAAP, during the period 1988 to 1994?
• What were the *de facto* differences in reported profits under UK accounting principles and US GAAP in 1988 and 1994, and what were the relative magnitudes of those differences?
• What implications do the quantified differences have for policy makers in setting UK standards, with particular regard to alignment with the IASs?
The key findings of the study are as follows:
1. Between 1988 and 1994 the most significant element of *de jure* harmonisation was the virtual elimination of extraordinary items in UK reported profits, moving closer to the US position.

2. Between 1988 and 1994 the issue of new US standards increased the level of *de jure* disharmony in terms of the number of potential causes of difference. This was evidenced by the summaries of changes in regulation and by the increased number of categories of adjustments reported by the companies surveyed.
3. As regards *de facto* disharmony, in both 1988 and 1994 the UK reported profit was significantly greater than that under US GAAP. Between 1988 and 1994 the difference between UK and US reported profit increased and the change was statistically significant.
4. In respect of those situations where measurement practices in the UK are not compatible with either US GAAP or IASs (Panel (a) of Table 1), the partial index of comparability indicated that the impact of goodwill amortisation was significantly greater in 1994 than in 1988. The impact of deferred taxation was statistically significant in 1988, but not in 1994. The impact of pension costs and retirement benefit costs, although frequently occurring, was not statistically significant in either year. Capitalisation of development costs, adjustments in respect of financial instruments and matters related to consolidation policy and discontinued operations occurred relatively infrequently.
5. Other adjustments of interest in relation to the gap between UK and US reported profit were related to asset revaluation and to the distinction between assets and expenses. Both indicate a

Table 7
Index of comparability for profit

7a. Mean value and t-statistic

Year	N	Mean	St Dev	SE mean	t	P value
Profit 1988	25	1.17	0.33	0.07	2.55	*0.01
Profit 1994	†23	1.25	0.47	0.10	2.61	*0.01
Partial adjustments						
Goodwill 1988	24	1.13	0.18	0.04	3.57	*0.01
Goodwill 1994	††22	1.21	0.30	0.06	3.36	*0.00
Deferred tax 1988	22	1.06	0.14	0.03	2.17	*0.04
Deferred tax 1994	23	1.00	0.13	0.03	0.11	0.91
Pension costs 1988	10	1.01	0.05	0.02	0.79	0.45
Pension costs 1994	†††18	1.02	0.13	0.03	0.52	0.61

*Significant at 5% (1-tail test for profit and goodwill, 2-tail test for deferred tax and pension costs)
† For information on 2 outliers excluded from t-test, see Table 3
†† For information on the outlier excluded from t-test, see Table 4
††† For outlier excluded from t-test, see Table 6

7b. Actual median, Wilcoxon statistic and estimated median

Year			1988				1994	
	N	Median	Wilcoxon statistic	P value	N	Median	Wilcoxon statistic	P value
Profit	25	1.10	244.0	0.02	25	1.18	268.0	*0.00
Goodwill	24	1.06	300.0	0.00	23	1.15	268.0	*0.00
Deferred tax	22	1.01	184.5	0.06	23	1.00	135.0	0.94
Pension costs	10	1.01	33.0	0.61	18	1.02	106.0	0.38

(No outliers excluded)
*Significant at 5% (1-tail test for profit and goodwill, 2-tail test for deferred tax and pension costs)

7c. Wilcoxon matched-pairs signed-ranks test

Adjustment (94 vs 88 in pairs)	N	Mean rank +ve ranks	Mean rank +ve ranks	Cases with +ve ranks	Cases with −ve ranks	Ties	Z	2-tailed P
Total	25	14.81	9.78	16	9	0	−2.00	*0.05
Goodwill	23	13.94	7.57	16	7	.0	−2.59	*0.01
Deferred tax	21	10.17	11.33	6	15	0	−1.89	0.06

*Significant at 5%

relative lack of conservatism in US income measurement, in terms of the lower depreciation charge under historical cost and of the instances where an item is amortised over a period, having been treated as an expense when incurred in the UK. Income smoothing is the most obvious explanation of the second observation. It would be possible for many of these UK practices to continue as acceptable within the bounds of IASC standards. The detail provided in this paper indicates the flexibility of measurement which may survive within a programme of global standard setting.

These research findings have relevance for both the FASB and the ASB in relation to accounting standards. However, generalisation from these results is limited because the companies included are all multinational companies of relatively large market capitalisation. Nevertheless, the financial statements presented by these companies in the UK purported to represent, at each date, a true and fair view of commercial reality. If the divergence from US GAAP increases there may be a perception for US readers that there is an increasing question mark over what represents that commercial reality. UK readers of the 20-F may also question the extent of the difference. The companies undertook essentially the same business at both dates, and so observers might question the credibility of accounting as a means of representing the activities of a business. It is pertinent to note that the UK companies listed in Appendix B are all high-profile organisations having an international presence commercially, and of necessity

Table 8
Recognition of assets

Nature of adjustment (*indicates that one or more of the adjustments reported has an index number less than 1.0)	1988	1994
UK asset with amortisation; US expense when incurred		
Deferred expenditure	—	1
Development costs	1	1*
Purchased R&D expenditure†	—	1
UK expense when incurred; US asset with amortisation		
Acquisition related items (UK debit may to P&L or to reserves)	1*	1
Amortisation of software development costs	1*	1
Program production and development	—	1*
Amortisation of favourable leaseback terms	1	1
Natural resources depletion	—	1
Timberlands depletion and reforestation	—	1
Replacement expenditure (infrastructure assets)	1*	1*
Interest capitalisation†	5*	6*
Loan origination fees and costs	2	2*
UK write-off against reserves; US asset with amortisation		
Amortisation of capital restructuring costs	—	1
Amortisation of convertible bond expenses	1	—
Amortisation of debt issue expenses	1	—
Amortisation of preference share issue costs	—	1
Convertible redeemable preference share issue costs	1	1

†Issues on which there is a specific IAS

feature prominently in relation to the campaign to persuade the SEC to allow foreign registrants to follow IASs rather than FASB standards.

The FASB has pointed to an apparently alarming number of differences between US standards and IASs. This paper has shown that in terms of the concept of materiality it seems unlikely that many of these differences will have an impact on the reported profit of UK multinational companies. The FASB should perhaps distinguish materiality of impact on measurement from detailed aspects of disclosure.

In the UK context, the early years of the work of the ASB concentrated on domestic-oriented issues and by the 1994 reporting period had not significantly reduced the differences between UK and US reporting practices. In the same time period the FASB was issuing standards which were taking US practice further from UK practice. The consequence for UK companies seeking finance in the US market is that they have reported increasingly different profit figures under the two reporting regimes.

The findings of this paper contain a message for the work of the ASB in relation to the IASC work programme and in relation to the ASB's stated aim of ensuring that, through a process of regular communication, accounting standards are produced with due regard to international develop-ments. The subject areas causing greatest difficulty are those where there is the most frequent need for an item of reconciliation and the differences are material in sufficient cases to attract continued interest. Furthermore, the differences (taken as a whole) are increasing over time. It is a matter for further investigation as to whether investors do in fact have 'coping mechanisms', in relation to accounting differences, which can cope with growing disparity.

With the introduction of the accounting standard FRS 10 (ASB 1997) relating to intangible fixed assets, it appears that the ASB may have overcome difficulties with the most significant item, namely accounting for goodwill. It is not yet clear though that US regulators would accept impairment reviews of long-lived intangibles if the impairment test of the UK and the IASs differs from that of the US. Irrespective of the goodwill debate, it seems possible however that, if the ASB bows to national pressure rather than moving towards international practice in the particular topics of accounting for deferred taxation and pension costs, reconciliations will continue to be required by the SEC of UK companies.

The research findings also raise a question as to the relationship between UK companies and the standard setters. It may be that the approach most

suited after completion and acceptance of the IASC core standards project will be:

- International companies — Apply IASs
- Listed national companies — Potentially facing choice between IASs and UK standards
- Large unlisted national companies — Apply UK standards
- Small national companies — Apply FRSSE (Financial Reporting Standards for Smaller Enterprises).

Such a solution would mean that only multinational and listed national companies would be likely to have a direct interest in matters of harmony or disharmony, while companies essentially having a domestic base would continue to take the guidance of standard setters in a national context.

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Appendix A
Key differences between US and UK accounting policies, period 1988 to 1994, and comparison with relevant aspects of IASs. UK is compatible with IASs except where bold highlighting indicates differences.

Item	US GAAP	UK accounting principles	IASs
Goodwill	APB 17: Capitalise and amortise over a maximum period of 40 years.	SSAP 20: Immediate write-off against reserves. Amortisation over useful economic life is permitted but rarely applied. **SSAP 22 not compatible with IAS, FRS 10 (1997) moves closer to IAS 22 in principle but differences remain in significant details which could affect measurement aspects.**	IAS 22 Amortisation over a period up to 20 years is the required treatment. The practice of permitting goodwill on acquisition to be set against shareholders' interests was discontinued following the comparability project (Issued 1993, superseding 1983 version).
Deferred taxation	1988: For foreign registrants the situation was in transition from APB 11 (which required the deferral method and full provision) to SFAS 96, issued in 1987 but with implementation postponed, requiring the liability method with full provision. 1994: SFAS 109 (effective from 1992) requiring liability method with full provision.	SSAP 15 and Companies Act 1985 requiring the liability method with partial provision. **SSAP 15 (revised) (1978, 1985 1992) not compatible with the revised IAS 12.**	IAS 12 (issued 1979, reformatted 1995, revised Dec 1996) The 1996 revision satisfies the requirement of the core standards programme. It requires a liability method based on temporary differences and does not permit partial provision. The 1995 version required that the tax expense for the period should be calculated on the basis of 'tax effect accounting' using either the deferral or the liability method.
Pension costs	Throughout period: SFAS 87 and SFAS 88. Fundamental principle is to recognise the cost of an employee's pension over that employee's service period. The measurement rules are tightly defined and may be regarded as measuring 'current cost' of providing benefits. It is unlikely that SFAS 87 figures would precisely fulfil the requirements of SSAP 24.	SSAP 24, CA 85 and UITF 4. General principle is to recognise cost of providing pensions on a systematic and rational basis over the period during which the company benefits from the employee's services. The measurement rules allow flexibility within a principle of recognition of cost. It is unlikely that SSAP 24 figures would fulfil the requirements of SFAS 87.	IAS 19 (Issued 1983, revised 1993). Projected benefit valuation method is also allowed.
Post-retirement benefits other than pensions	1994: SFAS 106 required businesses to estimate the total future cost of providing such benefits and recognise that cost as an expense as employees render service, rather than when benefits are paid. Requirements are similar to those of SFAS 87.	However, SSAP 24 (1988 amended 1992) is stated to comply with IAS 19. UITF 6 and SSAP 24. The principles to be applied are similar to those for pension costs and accordingly SSAP 24 is applicable. Companies which use the measurement rules of SFAS 106 will be deemed to satisfy SSAP 24 principles. It is possible that measurement using the greater flexibility of SSAP 24 would not meet SFAS 106 conditions.	IAS 19 (Issued 1983, revised 1993). Benchmark treatment for all retirements is to use an accrued benefit valuation method. Projected benefit valuation method is also allowed.

Appendix A *continued*

Item	US GAAP	UK accounting principles	IASs
Extraordinary items	APB 30 and APB 16 Definitions unchanged throughout period.	1988: Definition in SSAP 6 superficially similar to that of US standards but more liberally applied in the UK. Consequently many items allowed as extraordinary in the UK were exceptional in the US. 1994: FRS 3 (issued 1992) emphasised the rarity of extraordinary items and effectively brought UK close to US.	IAS 8 Definitions of extraordinary items less rigorous than FRS 3. Disclosure required in income statement.
Valuation of property, plant and equipment	ARB 43 and APB 6 Require historical cost only.	CA 1985 permits valuation as an allowed alternative to historical cost. Depreciation must be based on revalued amount (SSAP 12).	IAS 16 Allows measurement subsequent to initial recognition (Issued 1993 superseding 1982) Benchmark treatment is historical cost, valuation is an allowed alternative.
Borrowing costs	SFAS 34 as amended by SFAS 42, SFAS 58 and SFAS 62 makes capitalisation compulsory for certain assets.	CA 1985 defines a fixed asset very generally, but no preferred treatment specified for borrowing costs. CA 1985 permits either capitalisation or write-off.	IAS 23 Benchmark treatment is that borrowing costs should be recognised as an expense in the period in which they occur. Allowed alternative permits capitalisation under specific conditions (Issued 1993 superseding 1984 version).
Foreign currency translation	FAS 52 requires that profit and loss account be translated at rate prevailing at time of recognition or at weighted average rate. For subsidiaries operating in hyper inflationary economics, temporal method is required.	SSAP 20 permits profit and loss account to be translated at average rate or at closing rate SSAP 20 (1983) permits translation of income and expenses at either average rate or closing rate. For subsidiaries operating in hyper inflationary countries, restate financial statements before translation.	IAS 21 Translate all assets and liabilities at the closing rate and income and expenses at exchange rate of date of transaction - average for the period is an acceptable approximation (Issued 1993 superseding 1983 version).
Capitalisation of development costs	SFAS 2, SFAS 68 and SFAS 86 require immediate write-off.	SSAP 13 and CA 1985 permit recognition of an asset where specific criteria are met, but choice of write-off is allowed. SSAP 13 permits capitalisation under specific conditions but allows write-off.	IAS 9 Requires capitalisation of development cost where specific conditions are met (Issued 1993 superseding 1978 version).
Dividends payable	Reg S-X: No provision for dividends undeclared at the year end.	CA 1985 Provision must be made for dividends relating to the financial year although not declared until after it ends.	IASs apply normal accruals requirements - UK practice is within the general principle of accruals.
Correction of fundamental errors resulting from accounting policy change	APB 20, SFAS 32 Cumulative effect of change to be shown as a separate item in profit and loss account. In certain circumstances restatement of prior year figures is allowed.	1988 SSAP 6 required adjustment to opening retained earnings and amendment of comparative information. 1994: FRS 3 continues this approach.	IAS 8 Benchmark treatment is to adjust the opening balance of retained earnings to take account of the cumulative effect on profit. Allowed alternative is to correct in the current period, giving sufficient additional information about the change (Issued 1993 superseding 1978 version).

Appendix A *continued*

Item	US GAAP	UK accounting principles	IASs
Business combinations	APB 16 requires purchase method for acquisitions and pooling of interests method for uniting of interests. The two are not interchangeable and specific criteria apply to each.	1988: SSAP 14 and SSAP 23 taken together meant that acquisition (purchase) accounting and merger (pooling of interests) were not necessarily mutually exclusive. 1994: FRS 2 with SSAP 23 still in place but FRS 6 was issued in Sept 1994 (effective for accounting periods commencing on or after 23 December 1994) tightening the rules on merger accounting to be stricter than US rules for pooling of interests. FRS 6 generally consistent with IAS 22	IAS 22 Defines acquisition and uniting of interest. The comparability project tightened up the definition of uniting of interest (issued 1993, superseding 1983 version).
Financial instruments	Considerable guidance in SFAS 52, SFAS 80, (relevant to 1988 and 1994 accounts) and SFAS 105, SFAS 107 and SFAS 114 (relevant to 1994 accounts).	Little authoritative guidance until FRS 4 was issued in December 1993 (effective for accounting periods ending on or after 22 June 1994). ASB issued exposure draft (1997) on disclosure aspects of financial instruments. **FRS4 (1993) prohibits 'split' accounting for capital instruments which have mixed debt and equity components.**	IAS 32 Primarily a disclosure standard. (Issued 1995) Measurement was taken as a separate project but 'split accounting' for capital instruments is required.
Restructuring costs	FAS 5 and Interpretation No 1 to APB 30 have generally resulted in restructuring costs being accrued. EITF guidance issued in 1994 was more restrictive than UK practice. Several specific standards exist in the US	Limited guidance in UK - some guidance in FRS 3 on provisions where there is a decision to terminate, but no specific standard.	No specific standard.
Revenue recognition		No specific guidance beyond the CA 85 - only subject to general requirement for prudence.	IS 18 Standard presents general principles. Revenue is recognised when it is probable that future economic benefits will flow to the enterprise and that these benefits can be measured reliably. (Issued 1993 superseding 1982 version).
Investments in marketable equity securities and debt securities	ARB 43 (applies to 1988 and 1994) plus SFAS 115 (applies to 1994 only). SFAS 115 requires an investment in debt or marketable equity securities to be classified as 'held-to-maturity', 'available-for-sale' or 'trading'. Accounting treatment depends on these categories rather than current/non-current classification.	CA 85 prescribes treatment based on classification as current or fixed. Current asset investments are normally stated at lower of cost and net market value. Under alternative accounting rules, current cost may be used. There are rules in UITF 5 for transfers from current assets to fixed assets. SSAP 19 (1981, 1992, 1994) requires revaluation of investment properties held as fixed assets. Current asset investments still under consideration; impairment under consideration.	IAS 25 current asset investments to be carried at market value or at the lower of cost and market value. Long-term assets to be carried at cost or revalued amount (Issued 1986, reformatted 1995) Project on impairment test was announced in June 1996 for general application to all intangible assets.

Appendix A *continued*

Item	US GAAP	UK accounting principles	IASs
Consolidation policy	Definition of control is similar to, but not an exact match to UK definition	All subsidiary undertakings must be consolidated. FRS 2 (1992) leaves almost no scope for exclusion of a subsidiary. Definition of control differs and, particularly following FRS 5 may cause consolidation of subsidiaries and quasi-subsidiaries not permitted in US. Unlikely to affect the 1988 and 1994 accounts analysed here.	IAS 27 Defines control. Allows exclusion of subsidiary if specific conditions are met. (Issued 1989, reformatted 1995).
Discontinued operations	APB 30, AIN-APB 30, EITF 85-36 and EITF 90-16. Definition differs from UK definition.	FRS 3, SSAP 22 and UITF 3. Definition differs from US definition - but reconciliations of profit measurement are rarely affected because this is a matter for separate disclosure within the overall reported profit.	IAS 8 Definition linked to US definition but less rigorous. disclosures required but, in contrast to US approach, under IAS 8 discontinued operations are to be included in the profit or loss from ordinary activities (Issued 1993, superseding 1978 version).
Stocks inventory	US permits LIFO as well as FIFO.	SSAP 9 (1975; 1980, 1988) UK encourages FIFO (LIFO allowed by SSAP 9 but not allowed for tax purposes). Does not affect reconciliations since US accepts FIFO.	IAS 2 Requires lower of cost and net realisable value. FIFO is benchmark treatment, LIFO is allowed alternative (Issued 1993 superseding 1975 version).

Sources: various SSAPs, FRSs and SFASs plus Price Waterhouse (1994), *An Introduction to US GAAP* for position at 1994 and Joint Study (1995), *Financial Reporting in North America*, various IASs and Epstein and Mirza (1997)

Abbreviations

AICPA	American Institute of Certified Public Accountants
AIN	AICPA Accounting Interpretations
APB	Accounting Principles Board
ARB	Accounting Research Bulletin
CA 85	Companies Act 1985
ED	Exposure draft
EITF	Emerging Issues Task Force
FRS	Financial Reporting Standard
Reg S-X	Regulation S-X issued by the Securities and Exchange Commission
SFAS	Statement of Financial Accounting Standards
UITF	Urgent Issues Task Force
US GAAP	Generally Accepted Accounting Principles in the US

Appendix B
List of UK companies analysed in this paper for comparison with Weetman and Gray (1991)

	Firm	Year end for 1988 data	Year end for 1994 data
1	Attwoods plc	31.7.88	31.7.94
2	Barclays Bank plc	31.12.88	31.12.94
3	BET plc	1.4.89	1.4.95
4	BOC Group plc	30.9.88	30.9.94
5	British Airways plc	31.3.89	31.3.95
6	British Gas plc	31.3.89	31.12.94
7	British Petroleum plc	31.12.88	31.12.94
8	British Steel plc	1.4.89	1.4.95
9	British Telecommunications plc	31.3.89	31.3.95
10	Cadbury Schweppes plc	31.12.88	31.12.94
11	Carlton Communications plc	30.9.88	30.9.94
12	English China Clays plc	30.9.88	31.12.94
13	Glaxo Holdings plc	30.6.89	31.12.95*
14	Hanson plc	30.9.88	30.9.94
15	ICI Group plc	31.12.88	31.12.94
16	Midland Bank plc	31.12.88	31.12.94
17	National Westminster Bank plc	31.12.88	31.12.94
18	NFC plc	1.10.88	1.10.94
19	Reuters Holdings plc	31.12.88	31.12.94
20	Signet Group plc	28.1.89	28.1.95
21	The Royal Bank of Scotland plc	30.9.88	30.9.94
22	Tomkins plc	29.4.89	29.4.95
23	United News and Media plc	31.12.88	31.12.94
24	Waterford Wedgwood plc	31.12.88	31.12.94
25	WPP Group plc	31.12.88	31.12.94

*Glaxo Holdings plc changed its accounting date so that there was an 18-month accounting period to 31 December 1995.

List of UK companies reported in Weetman and Gray (1991) not available for this work

Beazer plc	Takeover
Blue Arrow plc	Takeover
Cambridge Instrument Co plc	Not obtained
Dixons Group plc	No US listing in 1994
Huntingdon International Holdings plc	No US listing in 1994
Jaguar plc	Takeover
LEP Group plc	No US listing in 1994
Lex Service plc	No US listing in 1994
Plessey plc	Takeover
Rodime plc	Major reorientation of activity occurring
Saatchi and Saatchi Co plc	No UK listing in 1994
Shell Transport and Trading Co plc	US standards applied
Unilever plc	1994 reconciliation includes Unilever N.V.
Ward White plc	Takeover
WCRS plc (Aegis plc in 1994)	No US listing in 1994
Wellcome plc	Merger with Glaxo

Regression Analysis in Accounting Disclosure Studies

T. E. Cooke*

Abstract—A problem that sometimes occurs in undertaking empirical research in accounting and finance is that the theoretically correct form of the relation between the dependent and independent variables is not known, although often thought or assumed to be monotonic. In addition, transformations of disclosure measures and independent variables are proxies for underlying constructs and hence, while theory may specify a functional form for the underlying theoretical construct, it is unlikely to hold for empirical proxies. In order to cope with this problem a number of accounting disclosure studies have transformed variables so that the statistical analysis is more meaningful. One approach that has been advocated in such circumstances is to rank the data and then apply regression techniques, a method that has been used recently in a number of accounting disclosure studies. This paper reviews a number of transformations including the Rank Regression procedure. Because of the inherent properties of ranks and their use in regression analysis, an extension is proposed that provides an alternative mapping that replaces the data with their normal scores. The normal scores approach retains the advantages of using ranks but has other beneficial characteristics, particularly in hypothesis testing. Regressions based on untransformed data, on the log odds ratio of the dependent variable, on ranks and regression using normal scores, are applied to data on the disclosure of information in the annual reports of companies in Japan and Saudi Arabia. It is found that regression using normal scores has some advantages over ranks that, in part, depend on the structure of the data. However, the case studies demonstrate that no one procedure is best but that multiple approaches are helpful to ensure the results are robust across methods.

1. Introduction

This paper addresses the problem of empirically estimating the relation between accounting variables and examines the application of rank and normal scores regression in accounting disclosure studies. The focus is on data-analytical techniques based on transformations (Draper, 1988).[1] The paper argues that scholars undertaking research on disclosure issues should pay attention to the structure of the data and, where necessary, consider the appropriateness of transformations. Data should be screened to assess the impact of distribution

problems of skewness and kurtosis, as well as problems of outliers and non-linearity.

As well as data problems, another complication that sometimes emerges when undertaking empirical work in accounting and finance is that the theoretically correct form of the relation between the dependent and independent variables is not known. This problem sometimes arises in disclosure studies when a researcher attempts to explain the variability in disclosure indexes. Furthermore, a problem encountered in many disclosure studies is that the disclosure measures and independent variables are proxies for underlying constructs and, hence, while theory may specify a functional form for the underlying theoretical construct, it is unlikely to hold for empirical proxies.

A recent development in dealing with such problems is to transform the data and use Rank Regression rather than conventional OLS. The advantage of Rank Regression is that it yields distribution-free test statistics (non-parametric) and is therefore potentially useful when accounting datasets reveal non-linear monotonic relationships between independent and dependent variables. The first example of this procedure being used in disclosure studies was Lang and Lundholm (1993), followed by Wallace et al. (1994); Wallace and Naser (1995); Lang and Lundholm (1996).

This paper considers a number of transformations including Rank Regression and extends the latter by mapping observations on to the normal distribution rather than on to the positive inte-

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[1] Draper (1988) identifies four basic approaches to deal with violations of the technical assumptions of classical linear regression:
a. The do-nothing approach.
b. The data-analytic approach investigates influential observations and transformations.
c. The model expansion approach focuses on departures from assumptions once found and departures are modelled directly on the raw data scale by broadening the parametric model.
d. The robust approach which uses non-classical techniques so that deviations from the classical assumptions are not crucial, e.g. M−, R−, L− estimators.

gers.[2] The transformation proposed is achieved by dividing the normal distribution into the number of observations plus one segments on the basis that each segment has equal probability (van der Waerden, 1952, 1953). In effect, the ranks of the data are substituted by scores on the normal distribution and so the normal scores approach may be considered to represent an extension of the rank method.

It should be noted that the various transformations and approaches discussed in this paper are not mutually exclusive. In practice, several approaches can be undertaken to try to ensure that the results are not method-driven but are robust across methods.

The rest of the paper is divided into four sections. In the next section, consideration is given to data examination and transformations. Section 3 considers some of the transformations in the context of disclosure studies. The procedure for Rank Regression is outlined in more detail and the advantages and disadvantages of this approach are reviewed. The use of normal scores is then proposed as an alternative to Rank Regression. Section 4 provides an examination of two small databases on information disclosed in the annual reports of companies in Japan and Saudi Arabia and includes an analysis using standard OLS, Rank Regression, regression using normal scores, and regression using a log odds ratio transformation.[3] The two case studies serve to illustrate some of the points made earlier in the paper. Section 5 provides a summary and conclusions.

2. Data examination and transformations

Once data is collected it is important to review it carefully, regardless of the type of analysis that is being proposed. The examination may be undertaken in a number of ways. For example, a histogram of the observed values is one approach in which the values are divided into intervals of equal size and each column shows the number of cases within each interval.[4] Such analysis may be extended to identify outliers. The examination pro-

vides information on the distribution of observed values.[5]

Many statistical tests are based on the assumption that the data come from a normal distribution or that a sufficiently large sample is available to appeal to asymptotically normality of the test statistic. For example, in regression analysis an assumption is that the error term is normally distributed. These issues are considered later when a comparison is made between OLS and Rank Regression.

One approach to assessing the normality of the data is the normal probability plot in which the observed values are matched with expected values from the normal distribution. Visual inspection of data can be supported by statistical tests such as standard tests on skewness and kurtosis (Stuart and Ord, 1983)[6], the Kolmogorov-Smirnov (K–S) test and its modification by Shapiro-Wilks and Lilliefors.

Transformation of data is useful in regression analysis when the relationship between the dependent and independent variables is inherently non-linear, when the distribution of the errors is not approximately normal, and where there are problems of heteroscedasticity or non-independence of the error terms. Where possible, the determining factor should be based on the underlying theoretical relationship. It should be appreciated that transformations of disclosure measures and independent variables are proxies for underlying constructs and hence, while theory may specify a functional form for the underlying theoretical construct, it is unlikely to hold for empirical proxies.

In determining linearity, the important factor is the functional form of the relationship. The parameters must be linear so that the independent variables can be transformed to produce a linear model.

There are other circumstances when transformations may also be considered. For example, Iman and Conover (1979:500) have argued that 'the rank transform approach has an obvious advantage when the dependent variable is a monotonic function of the independent variable(s) and this monotonic relationship is non-linear in nature'. However, when non-linear monotonic relationships constitute a problem it is possible and sometimes desirable to undertake transformations of the data other than by using ranks.

Given normality and independence of the error term, the F-statistic can be used since large F-val-

ues suggest linearity. This can be further investigated with a scatterplot of the independent and dependent variables which should provide evidence of linearity. Further checks can be made by firstly plotting the residuals against the predicted values and secondly by plotting the residuals against the values of the independent variable.

If non-linearity is suspected, transformations may be considered, particularly in terms of powers, roots and logs. Tukey (1977) refers to a curve being convex from above (below) if the middle of three points on the curve is below (above) the line joining the other two. It is important to identify the form of the non-linearity since the object is to place the middle point on to the line joining the other two points.

Monotone non-linear relationships may be straightened by moving along the ladder of powers and roots which would include, for example, y^3, y^2, y, $y^{\frac{1}{2}}$, $\ln(y)$, $-y^{-\frac{1}{2}}$, $-y^{-1}$, $-y^{-2}$. Tukey (1977) suggests that if the three points are hollow upward then look down the ladder for linearity and if the hollow is downward look up the ladder. The same rules apply to explanatory variables x, so that if the curve bulges towards large x move up the ladder, and move down the ladder when the curve bulges toward small x. The bulging rule is shown in Figure 1.

Note that it is preferable to transform the independent variables rather than the dependent variable, because the latter disturbs the relationship between the dependent variable and the other regressors and because the error distribution is changed (Fox, 1984).

If the transformations shown in Figure 1 are applied and non-linearity persists then an alternative, which may be preferable in certain circumstances, would be to consider trimming the distribution. Since the arithmetic mean can be heavily influenced by outliers there may be an argument in favour of using the median. Estimators of location may be 'robustified' where assumptions about the underlying distribution are not restrictive.

An example of such an approach would be to eliminate the top 10% and bottom 10% of the distribution so that only 80% of the data values are used to establish a trimmed mean. Consideration should be given to using M-estimators (generalised maximum likelihood estimators) methods that do not exclude extreme values of the distribution but instead give less weight to extremes. Different weighting systems have also been proposed, such as those by Andrew, Hampel, Huber, and Tukey (see Hoaglin et al. 1983).

The next section considers the Rank transformation in some detail because it is much less well known than the transformations mentioned above. The procedure for Rank Regression is outlined and compared with OLS and is followed by

Figure 1
Determining a transformation to linearity by the bulging rule
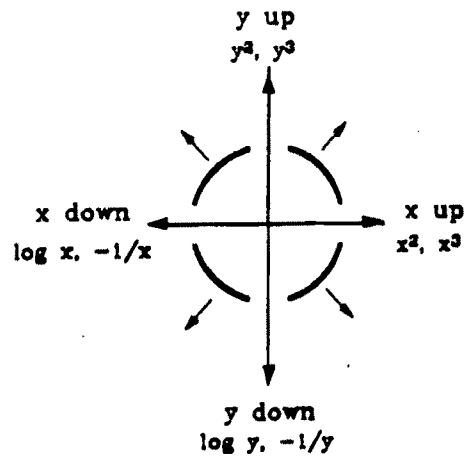
Lewis-Beck, M. S. (1993, editor). *Regression analysis.* London: Sage Publications.

a discussion of the advantages and disadvantages of this approach.

3. Transformation in accounting disclosure studies

3.1. The Rank Regression Procedure

In many areas of the social sciences, individuals are asked to rank their preferences. In accounting in particular, users of financial accounts have been asked to express their opinion on the usefulness of accounting information (see, for example, work by Epstein, 1975; Lee and Tweedie, 1975; Chang and Most, 1977; Anderson, 1981; Hines, 1982). When a researcher suspects that the underlying scale is only ordinal then one approach is to use ranks.[7] Ranks have been found to have a number of useful applications. For example, in the econometric literature, ranks have been used to develop tests of misspecification, particularly when survey data have endogenous and exogenous variables that are considered exchangeable (McCabe, 1989). The advantage in this case is that tests based on ranks, being distribution-free, do not require normality assumptions and so the ranks can be used to develop tests of heteroscedasticity and serial correlation (McCabe, 1989).

In the case of disclosure studies, the dependent variable is a metric ratio and therefore can be le-

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[7] Another approach would be to use Theil's method based on medians. However, in the case of multiple linear regression this approach is computationally cumbersome. For further details see Höllander and Wolfe (1973).

gitimately transformed, where necessary, and used in regression analysis. One transformation is to rank the dependent and independent variables.

The rank transform procedure has been stated by Iman and Conover (1979). Given a dependent variable y with n observations, the observations are placed in order and ranked from 1 to n (from smallest to largest). The procedure is to rank both dependent and independent variables so that with $R(y_i)$ being the rank assigned to the ith smallest value of Y, each of the independent variables (X_j (j = 1, ..., k) is replaced with their corresponding ranks 1 to n. Tied values are conventionally assigned the mean of the ranks for which they are tied.

The regression is undertaken on the ranks. For example, a bivariate relationship expressing $\hat{R}(y_i)$ in terms of $\hat{R}(x_j)$ would result in a regression of the form $\hat{R}(y_i) = \hat{\alpha} + \hat{\beta}(x_j)$. Given that the OLS regression line passes through the mean points $(\bar{R}(x)), (\bar{R}(y)) = ([n + 1]/2, [n + 1]/2)$ conventional ordinary least squares may be applied giving the estimated value of the coefficients as $\hat{\alpha} = [(n + 1)/2] (1 - \hat{\beta})$ and $\hat{\beta} = 1 - ([6\Sigma(R(y_i) - (R(x_i))^2)/[n(n^2 - 1)]$. Where no ties exist, Spearman's Rank correlation coefficient (rho) is the Pearson correlation coefficient applied to ranks and can be found as:

$$1 - 6\Sigma d_i^2/n (n^2 - 1) \qquad (1)$$

where $d_i = R(Y_i) - R(X_i)$. (In the presence of ties this formula is merely approximate.)

For the case of more than one independent variable the multiple regression is found by fitting:

$$R(y_i) = \alpha + \beta_1 R(x_{1i}) + \beta_2 R(x_{2i}) + \ldots + \beta_k R(x_{ki}) + \epsilon_i \qquad (2)$$

by least squares.

In effect, the Rank Regression specification shown above is an application of standard multiple regression and, as such, the data must fulfil two main conditions for hypothesis testing: normality of the errors and constant variance (homoscedasticity). Appropriate tests to assess the hypothesis that the observations on the dependent variable are normally distributed have been indicated in the previous section.

The homoscedastic assumption may be assessed by visual inspection of the residuals, or by using a specific test such as the Goldfeld-Quandt test, the Breusch-Pagan test or the White test (see Kennedy, 1992: 117–119).[8] It follows from these assumptions that the regressors x_j and the disturbance term are statistically independent, implying Cov $(x_j, \epsilon) = 0$.

Alternatively, the regression model may be specified in terms of the conditional mean of the dependent variable $E(y|x_1, ...x_K)$ which is determined conditionally on observations on the independent variables. The regression model assumes:

$$E(Y_i|x_{1, i}, x_{2, i}, \ldots x_{k, i}) = \alpha + \ldots \beta_k x_{k, i} \qquad (3)$$

and for homoscedasticity,

$$\text{Var } (Y_i|x_{1,i}, \ldots x_{k, i}) = \sigma^2.$$

In order to derive equation (3) the joint distribution of Y and vector X must be known, but to estimate the parameters the exact form of the joint distribution is not required. In order to perform tests of hypotheses about the parameters, the form of the distribution is required. It is commonly assumed that the joint distribution of Y and the independent variables X_j is multivariate normal, though there are other joint distributions which also have the property that the conditional mean of Y given the X_j is linear in X_j—for example, the Pareto distribution.[9]

In practice, estimators of the parameters in linear regression, with the joint normality of Y with the Xs assumption, have been found to be quite robust even when the normality assumption does not quite hold. In using Rank Regression the requirement of random samples still holds, but the normal distribution of Y does not.

3.2. Advantages/disadvantages of Rank Regression in accounting research

In the accounting literature, rank transformations of the residuals and forecasts from a linear regression model were used by Beaver et al. (1979) in assessing the relationship between unexpected earnings and risk-adjusted returns. As a technique it did not become particularly popular, but has been used recently by Cheng et al. (1992) to evaluate the specification of the cross-sectional OLS model that related unexpected earnings to risk-adjusted security returns. Cheng et al. (1992) argued that the rank transformation is invariant to power transformations that preserve order.

In other words, it is not necessary to standardise, log or undertake any power transformation or any monotonic transformation because they result in the same assignment of ranks. Rank transformations are also relatively insensitive to outliers. They found that '.. the use of power or rank transformation of the forecast error variable produces a substantial improvement in R^2' (Cheng et al. 1992: 539). The appropriateness of using R^2 in such circumstances is considered later in the paper.

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[8] In a time series context ARCH or GARCH models of heteroscedasticity may be appropriate.

[9] Note that in the classical linear model, the experimental values of the independent variables are fixed, whereas in the linear Regression model they are the result of a random process.

In 1993, Lang and Lundholm used rank transformations in their paper on cross-sectional determinants of analysts' ratings of corporate disclosures. They argue that the technique of Rank Regression has value when the theoretical relationship between the dependent and independent variables is not known but monotonic.[10] Rank Regression is also useful when the relationship between the dependent and independent variables is not strictly linear and there is no theoretical basis for suggesting a relationship between Y and X.

Wallace et al. (1994) used Rank Regression in their study of the relationship between the comprehensiveness of corporate annual reports and firm characteristics in Spanish listed companies. A sample of 50 companies was selected to produce a disclosure index and 60% of the variability of the indexes was explained by nine independent variables. Wallace et al. (1994: 47) suggest that:

'... there is no theoretically correct way of describing the association between the dependent and the explanatory variables. In such a circumstance, Lang and Lundholm (1993) have suggested the use of rank (OLS) regression as a powerful method of coping with data sets with non-linear but monotonic relations between dependent and independent variables. If a dependent variable changes in just one direction (either up or down) as the explanatory variable increases (i.e. if the relationship between them is monotonic) a higher-ranked independent variable will correspond to a higher-ranked variable, regardless of the precise relation between the two unranked variables.'

A similar approach was adopted in Wallace and Naser (1995). As well as these advantages Rank Regression is conceptually simple, preserves order, and is effective in modelling monotonic relationships where outliers are a serious problem.

A weakness of Rank Regression is that it is difficult to interpret β_i as the effect on Y_i of a marginal increase of 1 in X_i. For values of β_i of -1 or $+1$, β_i does have definite interpretation and for zero there is, of course, no association. However, within the range -1 to $+1$, ignoring zero, interpretation is difficult. For example, if in a sample Rank Regression $\beta_2 = 0.7$ then an increase in the rank of the right-hand-size variable increases the rank of the left-hand-side variable by 0.7, but the rank of the left hand side variable are integer. If the rank of the left-hand-side variable is estimated by the regression to be 8.7 does this imply the value of the left hand size variable is close to the value that has rank 9? An additional assumption of (linear) interpolation between the values of ob-

servations of ranks 8 and 9 is required in order to proceed to estimate $\hat{Y}_i$.

In the case of a bivariate Rank Regression, the Spearman correlation coefficient may be tested for significance using an exact test for which tables are published. In the case of multiple regression, one of the main disadvantages of Rank Regression is that of testing the significance of the estimated coefficients.

To undertake statistical tests of a hypothesis there needs to be knowledge of the distribution of the dependent variable, Y, or the joint distribution of Y and the independent variables. The form of the distribution, for samples of moderate size, determines the type of statistical test that can be performed, and without knowledge of the distribution the correct significance levels cannot be determined. Given (joint) normality of Y and X in bivariate regression, the analysis of variance F-test may be used to test the null hypothesis that there is no linear relationship between the two variables. In testing the hypothesis about β in the bivariate case the t test of β (H_0: $\beta = 0$), or equivalently of r, is the same as the F test. In the multivariate case where Y is normally distributed, the F statistic tests the null hypothesis that all the coefficients except the constant term are zero, i.e. $\beta_1 = \beta_2 = ... = \beta_k = 0$.[11]

Since ranks are distribution-free, testing for significance using the F and t-tests are not appropriate. An additional concern with Rank Regression is that the error structure cannot be normal and the mapping of individual observations to ranks is a somewhat arbitrary transformation.

Another feature of using ranks is that the data after transformation are ordinal rather than interval and therefore the tests are effectively non-parametric and as such are weaker than parametric tests. This may be important when the sample size is small—a characteristic of many disclosure studies.

Siegel and Castellan (1988) point out that parametric tests are better than non-parametric tests when the assumptions of a parametric statistical model, in terms of the data, are met. This is because the power-efficiency of the parametric test is much greater than for non-parametric tests. In the context of disclosure studies where data collection is often onerous, parametric tests have obvious advantages.

In summary, Rank Regression has a number of advantages as well as some inherent weaknesses.

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[10] An alternative approach is non-parametric regression.

[11] There is a disagreement in the statistical literature about violations of the regression assumptions. For example, Kerlinger and Pedhazar (1973) argue that OLS is 'robust' to violations whereas Bibby (1977) maintains that violations render the technique almost worthless. In practice, the F-test for equality of variances is sensitive to departures from normality, although t-tests are less sensitive.

Consequently, the use of normal scores is advocated in this paper as an additional approach to the use of ranks. Normal scores effectively extend the rank approach to eliminate some of the weaknesses while retaining the advantages.

3.3. Development of the normal scores approach

An alternative to Rank Regression and other data transformations when non-linearity is a problem is proposed here and is based on normal scores. The transformation proposed is from actual observations to the normal distribution by dividing the distribution into the number of observations plus one regions on the basis that each region has equal probability. This method is referred to as the van der Waerden approach (van der Waerden, 1952, 1953).[12] In effect, the ranks are being substituted by scores on the normal distribution and so the normal scores approach may be considered to represent an extension of the rank method. For example, if there are six observations the normal distribution would be divided into seven equally probable parts so that the original values are replaced by normal scores (here -1.0676, -0.5659, -0.1800, 0.1800, 0.5659, 1.0676) rather than the ranks 1, 2 ..., 6.[13] The regression analysis would then proceed using the normal scores as the dependent variable. In addition, continuous independent variables may also be transformed to normal scores.

In 1938, Fisher and Yates first suggested the replacement of the original observations in standard normal theory tests. Tables of normal scores were developed for different size samples by David et al. (1968), Harter (1961, 1969) and Owen (1962).[14] The proposal suggested here is to utilise knowledge about normal scores to transform regression variables. The main advantage of replacing the ranks by normal scores is that the resulting tests would have exact statistical properties because (a) significance levels can now be determined, (b) the F and t-tests are meaningful and (c) the power of the F and t-tests may be used. In addition, the regression coefficients derived using normal scores are meaningful, whereas β_i from Rank Regression is difficult to interpret for most values.

The Appendix shows the derivation of the normal scores measure and its application to test the null hypothesis that all samples are identical.

A further characteristic of normal scores is that the approach offers a means whereby a non-normal dependent variable may be transformed into a normal one and as such offers a further advantage over ranks. A normally distributed dependent variable implies that the errors are also normally distributed by the assumptions of OLS.

The normal scores approach has the same advantages as ranks when there are problems of monotonicity and non-linearity. Normal scores preserve monotonicity in relationships as do ranks, with higher-ranked values of the independent variables being associated with higher-ranked values of the dependent variables (the converse is also true). In addition, when there is non-linearity with data concentration, normal scores disperse that concentration, an advantage also gained when using ranks. Whether normal scores are better than ranks in dealing with problems of monotonicity and non-linearity depends on the structure of the data.

An implication of the use of normal scores is that if an additional case is added to the sample, all the normal scores would need to be recomputed. However, the same will also usually be true of ranks: if an additional case is added to the sample then some of the ranks will change unless the new observation is ranked higher than all existing observations. The probability of such an event is low since the observation would be in the tail of the distribution. Thus, the recomputing disadvantage when new observations are added applies to ranks in many circumstances, such that the disadvantage of normal scores relative to ranks is negligible.

An issue that so far has not been considered is whether the transformation to normal scores should involve only the dependent variable or should relate to both the dependent and independent variables. In most instances it should be the latter, although if the only reason to use the approach is to normalise the dependent variable, then the former might be considered. Changing only the dependent variable implies changing the relationship between the dependent variable and all independent variables.

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[12] The van der Waerden approach may be summarised as = $r/(n + 1)$. Alternatives include Blom = $(r - 3/8)/(n + 1/4)$, Rankit = $(r - 1/2)/n$, and Tukey = $(r - 1/3)/(n + 1/3)$.

[13] These figures were derived using SPSS and represents one approach to deriving normal scores. An alternative approach would be based on expected values, such that in this case the normal distribution would be divided into six parts and the normal score would be taken as the expected value of each part. Thus, the normal score for the first observation may be calculated as follows:

$u_1 = E(X_1) = \int_{-\infty}^{c} x f(x) \, dx$ which is the p.d.f. of $N(\mu, \sigma_2)$

where $P(X < c) = 1/n$

This requires substantial computation but tables are available such as in Lindley and Scott (1984).

[14] I am grateful to Dr K. Read who informed me that variations on the suggestion made in this paper, with respect to normal scores, have been used in the medical research literature (e.g. Morgan (1992)).

3.4. Log of the odds ratio

An alternative transformation to those already outlined is the log of the odds ratio. When it is

assumed that the assumptions of the classical linear regression model hold, then a possible transformation in disclosure studies is the log of the odds ratio of the dependent variable. A problem in disclosure studies is that the dependent variable—the extent of disclosure in corporate annual reports—is bounded in the sense that no disclosure by a company will receive a zero and disclosure leads to a positive index that approaches one (100%) when there is full disclosure. As a result, it is theoretically possible to have an estimated disclosure index outside the zero-one range. One approach to overcome this problem is to use the log of the odds ratio (ln [disclosure index/ (1 − disclosure index)]), to ensure that the range is that of a normal distribution from $-\infty$ to $+\infty$ thereby overcoming the biased prediction problems that may affect truncated variables (Ahmed and Nichols, 1994).

This has the additional merit that, given the assumptions of the classical linear regression model, a normally distributed dependent variable implies that the distribution of the errors will also be normal. In most disclosure studies prediction is not the purpose of the study, but rather an explanation of the variability of the disclosure scores is sought and so the problem is of limited importance.

4. Application of transformations to disclosure studies (Japan and S. Arabia)

This section reports the results using data from disclosure studies on Japan and Saudi Arabia. An examination of the data is undertaken and is followed by regressions using untransformed data, the log odds ratio transformation of the dependent variable, ranks, and normal scores (first, with only the dependent variable transformed and then with all continuous variables being transformed). The models are reported upon for comparison purposes and should be considered in the context of the previous discussions. The two countries used are those for which the researcher has access and in both cases one of the original objectives of the studies was to explain the variability in disclosure indexes.

Japan is a developed country with the second largest economy and stock exchange in the world after the US. Saudi Arabia, in contrast, is a small developing country but the world's largest exporter of oil.[15] The two datasets provide contrast and help to highlight the point that the data should be examined in detail before deciding upon an appropriate statistical method.

An issue not yet considered is how to assess the regression models. In postulating relationships among variables, we want to know how powerful

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[15] The number of disclosure studies on developing countries is increasing considerably; e.g. Nicholls and Ahmed, 1995.

Figure 2
Stem-and-leaf plot of the untransformed voluntary disclosure scores (Japan)

Frequency	Stem & Leaf
3.00	0 . 778
8.00	1 * 11334444
11.00	1 . 55567778899
3.00	2 * 000
2.00	2 . 89
3.00	3 * 223
4.00	3 . 5779
1.00	4 * 1

Stem width: 0.10
Each leaf: 1 cases(s)

an explanation our regression model provides. The closer the regression line to actual points, the better the equation 'fits' the data. In assessing measures of best fit it could be argued that the coefficient of determination, R^2, is a possibility. Perhaps R^2 is not the ideal measure of best fit for judging differences in right-hand-side variables because it is not invariant to changes in parameterizations of left-hand side variables. In this case, it is preferable for the mean square error (MSE) to be minimised (MSE $= 1/n \ \Sigma(y_i - \hat{y}_i)^2$), $\hat{y}_i$ being calculated from the appropriate inverse transformation of the regression equation. The MSE is used to compare regression equations.
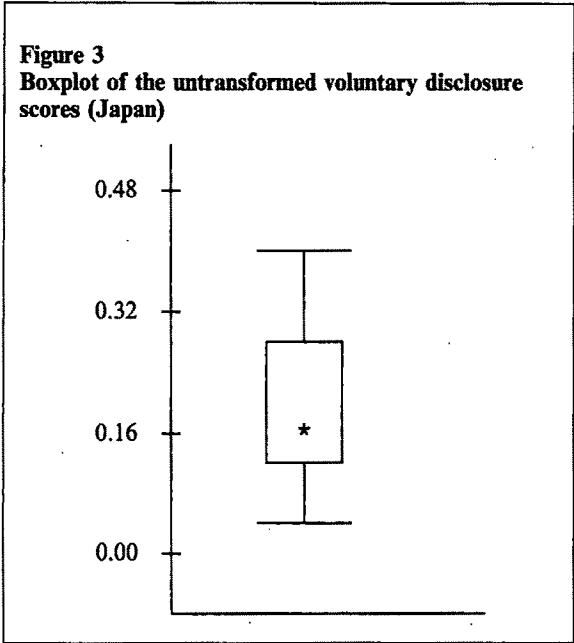
4.1. Case I: model based on Japanese data

The data on Japanese companies form part of a dataset used by Cooke (1991 and 1992). The data used here relate to voluntary disclosure in the 1988 annual reports of Japanese listed corporations.

Figure 2 shows the stem-and-leaf plot of the untransformed voluntary disclosure score. The stem indicates that the disclosure index scores range from less than 10% to 41%, with the majority of cases having a score of between 15% and 19%. Figure 3 shows the boxplot, which reveals a median of 17%, a 25th percentile of 11% and a 75th percentile of 29%. The smallest observed value that is not an outlier is 7% and the largest observed value that is not an outlier is 41%. Since this is the complete range no extreme values are reported, i.e. there are no cases with values between 1.5 and 3 box lengths from the edge of the box.

Figures 4 and 5 show the normal plot and detrended normal plot of the dependent variable. The normal plot shows that the observations do not cluster around a straight line and the deviations from a straight line are not randomly distributed around zero. The visual interpretation may be supported by some statistical tests. The descriptive statistics are shown in Table 1 and

Figure 3
Boxplot of the untransformed voluntary disclosure scores (Japan)

transformed data is negative because all the disclosure indexes are less than 0.5. Standard tests on skewness and kurtosis reveal a problem in terms of the latter. Since kurtosis exceeds 3, a larger proportion of cases falls into the tails of the distribution than those of a normal distribution. The Lilliefors test is significant at the 5% level, suggesting non-normality.

When the dependent variable is transformed to ranks there is no longer an apparent problem of non-normality, though clearly the ranked data are non-normal, even though both standard tests on skewness and kurtosis are satisfactory and the Lilliefors test statistic suggests normality (K-S greater than 5%).[17] The standard tests are satisfactory for the normal scores since the transformation is to the standard normal distribution [N(0, 1)].[18] The transformation leads to a mean and standard deviation of approximately 0 and 1 respectively (see Table 1).

4.2. Independent variables
Listing status

A distinction is made between companies that have multiple listings and those that are listed only on the Tokyo Stock Exchange (TSE). The measure is expressed as a dummy dichotomous variable such that the expected relationship with the independent variable is that disclosure will increase the greater the exposure to foreign capital markets (see

standard tests on skewness and kurtosis reveal a somewhat skewed dependent variable. The non-parametric Lilliefors test is significant at the 5% level revealing evidence of non-normality.[16]

A log odds ratio transformation of the dependent variable leads to a mean of −1.461 and standard deviation of 0.602. The mean of the

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[16] A variable that takes only positive values cannot be normal since by definition, it must lie in the range − ∝ to +∝. For a random variable with small variance and relatively large mean, the probability that it falls less than zero may be minimal.

[17] SPSS provides a significance level up to 0.200 but after that reports >0.200.
[18] Where the dependent variable is converted into normal scores necessarily the Kolmogorov-Smirnov statistic will be unity.

Figure 4
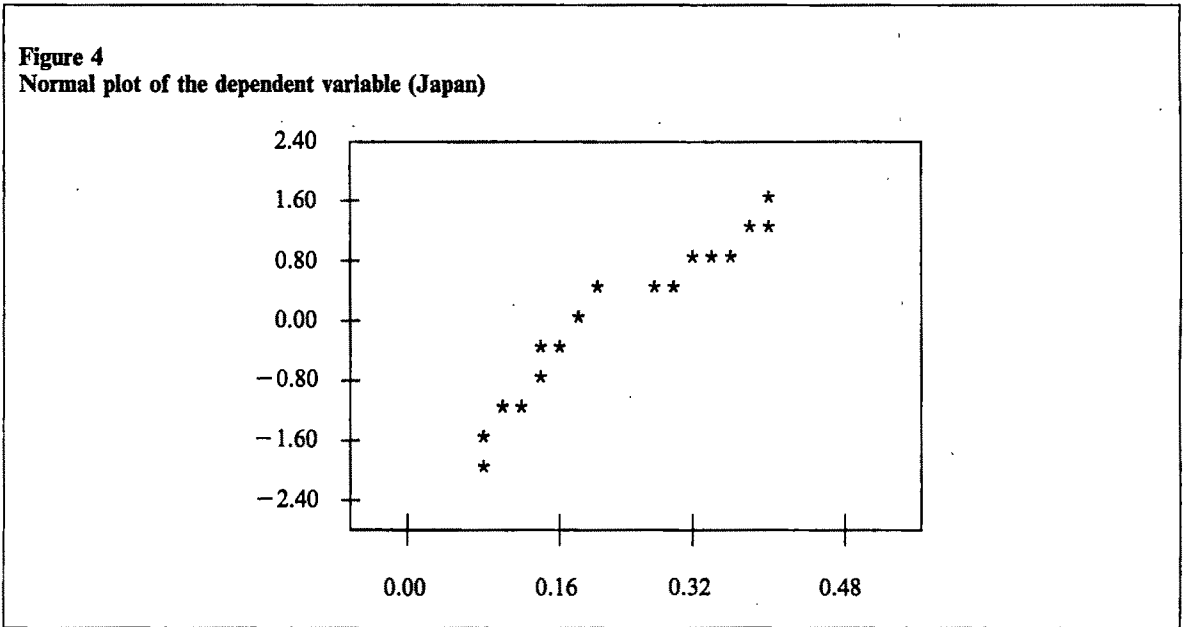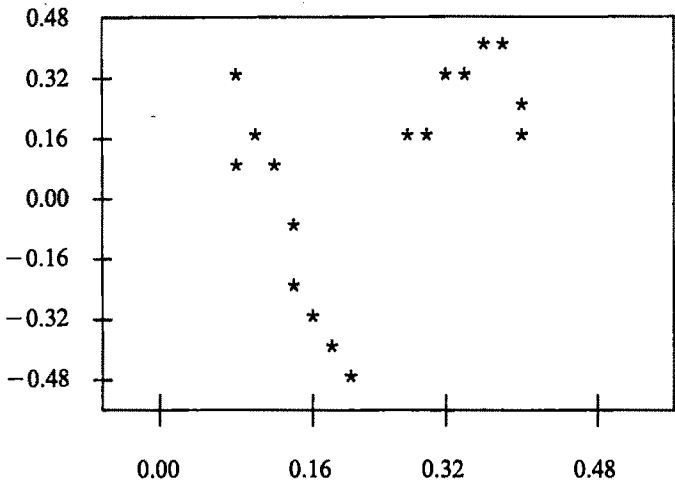**Normal plot of the dependent variable (Japan)**

Figure 5
Detrended normal plot of the dependent variable (Japan)

Singvi and Desai, 1971; Spero, 1979; Firth, 1979; Cooke, 1989a). Thus, multiple listed companies are expected to disclose more information than those listed only on the TSE, particularly where the extent of disclosure in foreign stock markets is greater than that in Japan (see for example, Biddle and Saudagaran, 1991).

Industry sector

This variable is included as a dummy in which a distinction is made between manufacturing enterprises and non-manufacturing companies. The expectation based on the literature is that manufacturing companies disclose more information than non-manufacturing enterprises (see Stanga, 1976; Cooke, 1989c), although the direction of the

relationship is somewhat uncertain (Wallace et al., 1994).

Borrowing ratio

This ratio measures the proportion of total assets financed by bank borrowings. It has been hypothesised that companies with a higher proportion of their assets financed by bank borrowings will disclose more information in their annual reports to meet some of the needs of their lenders (see Jensen and Meckling, 1976; Myers, 1977; Schipper, 1981; Leftwich et al., 1981; Belkaoui and Kahl, 1978; Malone et al., 1993; and Wallace et al., 1994).

Table 1
Descriptive statistics of the voluntary disclosure indexes - Japan

| | Data sources | | | |
	Untransformed	*Log odds ratio*	*Rank*	*Normal scores*
Mean	0.204	−1.461	18.000	0.002
Standard deviation	0.907	0.602	10.226	0.920
Minimum	0.070	−2.590	1.500	−1.732
Maximum	0.410	−0.360	35.00	1.915
Skewness	0.760	0.183	0.004	0.024
S.E. Skewness	0.397	0.398	0.398	0.398
Kurtosis	2.404	2.410	1.799	2.478
S.E. Kurtosis	0.777	0.778	0.778	0.778
Z test - skewness	1.914	0.460	0.010	0.060
Z test - skewness	−0.767	3.098	−1.544	−0.671
Kolmogorov-Smirnov (Lilliefors- signif.)	0.000	0.017	>0.200	>0.200

Turnover

Turnover is a measure of size and the expected relationship is that disclosure will be higher for larger companies (see Buzby, 1972; Choi, 1973; Firth, 1979; Schipper, 1981; Cooke, 1989a; Cooke, 1989b).

However, there is a theoretical argument that large firms are more visible than smaller firms and as a result are more exposed to political attacks (Jensen and Meckling, 1976). It is possible that firms will respond by reducing the extent of disclosure in corporate annual reports. Thus, the theoretical relationship is somewhat uncertain although assumed to be monotonic (Lang and Lundholm, 1993; Wallace et al., 1994; Wallace and Naser, 1995).

Model specification

The full specification of the regression is:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \epsilon_i$$

where

   Y = disclosure index scores

   Listing status
   X_1 = 1 if the company is multiple listed
      0 if otherwise

   Industry sector
   X_2 = 1 if the company is a manufacturing enterprise
      0 if otherwise

   Continuous variables
   X_3 = the proportion of total assets financed by bank borrowings

   X_4 = turnover

   ϵ = error term
   i = 1, ... 35
   β = parameters (where the constant β_0 adjusts for any excluded dummy variables)

The information provided in Table 2 should be read in the context of the cautionary notes discussed previously, particularly the significance of the t-tests when using Rank Regression. Using ranked data (Model 3, Table 2), all the variables included in the model were found to be significant at the 5% level with the exception that multiple listed companies did not disclose significantly more voluntary information than those corporations with only a listing on the TSE. This finding is consistent with that of Biddle and Saudagaran (1991) and Wallace and Naser (1995).

When the dependent variable was transformed (Model 4, Table 2) into normal scores, both turnover and listing status were found not to be significant. However, when the dependent variable and the continuous independent variables were transformed into normal scores (Model 5, Table 2), only listing status was found not to be significant, a result consistent with the Rank Regression approach. When no transformations are undertaken and when the dependent variable is the log of the odds ratio, the results are consistent with the ranked data and with the approach that transforms both the dependent and continuous independent variables into normal scores.

Thus, non-manufacturing companies disclose significantly less information than manufacturing corporations in all the models. In addition, higher levels of gearing are associated with higher levels of disclosure, and multiple listed companies do not voluntarily disclose more information than those companies listed only on the TSE.

However, the findings with respect to the size variable, turnover, and the constant term is not the same for all models. When the dependent variable is normalised both the constant term and turnover are found not to be significant. When both the dependent and continuous independent variables are normalised the constant term is not significant. Using different models on this dataset suggests that, in the main, the same variables are significant although with differing coefficients. The coefficients attached to the constant and to turnover are significant in most of the models, but not all.

With regard to the use of ranks, in estimating Y given $R(Y)$ it is necessary to undertake a linear interpolation. In this dataset the untransformed index is constrained to be $0 \leq index \leq 1$; then for an observation for which $\hat{R}(Y) < 1$ or $\hat{R}(Y) > n$ interpolation is possible taking $R(0) = 0$ and $R(1) = n+1$. This procedure is not available for variables with unconstrained limits, which is particularly important for variables such as sales when the upper limit is unconstrained (i.e. it would be difficult to establish a suitable value for $\hat{Y}$ when $\hat{R}(Y)$ exceeds the sample size).

The MSE based on ranks (with interpolation) was the lowest (0.0032), followed by the log odds ratio of the dependent variable (0.0034), the normal scores of the dependent variable (0.0035), the unadjusted dependent variable (0.0039), and finally by the normal scores of both the dependent and independent continuous variables (0.0057).

For information purposes, the $\bar{R}^2$ based on Rank Regression is highest (0.66346) followed by the normal scores for both the dependent and independent variables (0.64148), the log odds ratio transform of the dependent variable (0.62443), the dependent variable converted to normal scores (0.61926), and the untransformed model (0.58658).

4.3. Case II: model based on Saudi Arabian data

The data on Saudi Arabian companies used here relates to disclosure, voluntary and mandatory, in the 1990 annual reports of Saudi Arabian listed

Table 2
Regression analyses of determinants of disclosure scores by Japanese corporations

Independent Variable	(1)	(2)	Model (3)	(4)	(5)
Non manufacturing companies	−0.084687	−0.632783	−13.911085	−1.060822	−1.226670
	(−3.354)*	(−4.245)*	(−5.874)*	(−4.628)*	(−5.572)*
Gearing	0.165240	1.038538	0.324748	1.732437	0.308971
	(2.549)*	(2.714)*	(3.168)*	(2.944)*	(2.934)*
Turnover	3.265241E-08	1.844500E-07	0.322267	2.416326E-07	0.287893
	(2.465)*	(2.359)*	(2.304)*	(2.010)	(2.035)*
Multiple listed	0.059111	0.339115	2.993745	0.476006	0.344652
	(1.962)	(1.907)	(0.939)	(1.741)	(1.183)
Constant	0.156742	−1.710596	9.075517	−0.344931	0.217481
	(7.751)*	(−14.328)*	(3.361)	(−1.879)	(1.502)
MSE#	0.00391	0.00337	0.00319	0.00354	0.00565
$\bar{R}^2$	0.58658	0.62443	0.66346	0.61926	0.64148
Standard error	0.06252	0.36908	5.93236	0.56754	0.55073
F	13.06005	15.13198	17.75725	14.82511	16.20827

The upper figures for each variable are coefficients and the lower figures are the t-statistics. The coefficients of the excluded dummy variables are all 1.00000 since they act as benchmarks for the included dummies.
* = significant at the 5% level.
# = $1/n \; (Y_i - \hat{Y}_i)^2$, see text for further discussion.
Model 1 Regression using untransformed data.
Model 2 Regression using the log odds ratio [ln(x/(1-x)].
Model 3 Regression using ranked data.
Model 4 Regression using a transformed dependent variable to normal scores.
Model 5 Regression using normal scores for the dependent and independent variables.

corporations. The disclosure data on 33 companies is chosen because the dependent variable reveals characteristics of non-normality.

Figure 6 shows the stem-and-leaf plot of the untransformed voluntary disclosure scores. The stem indicates that the disclosure index scores range from 33% to 95%, with the majority of cases hav-

Figure 6
Stem-and-leaf plot of the untransformed voluntary disclosure scores (Saudi Arabia)

Frequency	Stem & Leaf
3.00	Extremes (0.33), (0.54), (0.54)
3.00	6 . 668
3.00	7 * 124
6.00	7 . 556679
14.00	8 * 00001111112223
1.00	8 . 5
2.00	9 * 01
1.00	Extremes (.95)

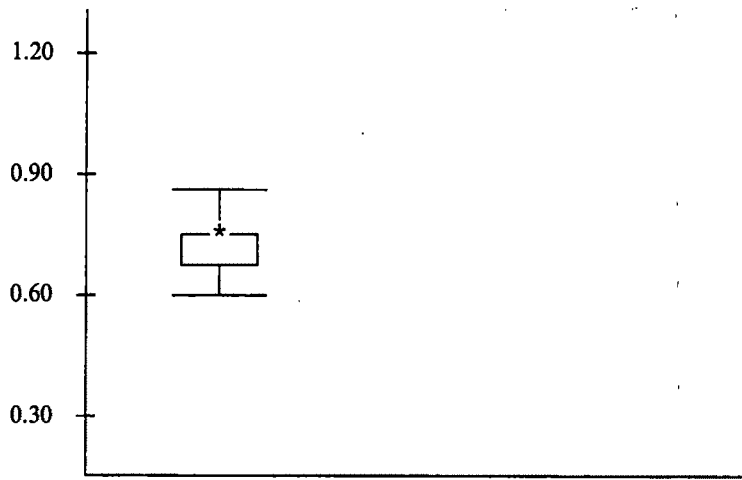Stem width 0.10
Each leaf: 1 case(s)

ing a score of between 80% and 83%. Figure 7 shows the boxplot which reveals a median of 80%, a 25th percentile of 68% and a 75th percentile of 75%. The smallest observed value that is not an outlier is 66% and the largest observed value that is not an outlier is 91%. The extreme scores of 33% and 95% may be considered to be outliers.

Figures 8 and 9 show the normal plot and detrended normal plot of the dependent variable. The normal plot shows that the observations do not cluster around a straight line and the deviations from a straight line are not randomly distributed around zero. The visual interpretation may be supported by some statistical tests. The descriptive statistics are shown in Table 3. The mean of the untransformed data is 0.766 with a standard deviation of 0.117 and a range from 0.333 to 0.953. Standard tests on skewness and kurtosis reveal problems of skewness and kurtosis of the dependent variable. The non-parametric Lilliefors test is significant at the 5% level, revealing considerable evidence of non-normality. When the log odds ratio of the dependent variable is used the mean is 1.278 with a standard deviation of 0.653. Standard tests on skewness and kurtosis re-

Figure 7
Boxplot of the untransformed voluntary disclosure scores (Saudi Arabia)

veal a problem in terms of the latter. Since kurtosis exceeds 3, a smaller proportion of cases falls into the upper tail of the distribution than those of a normal distribution. The Lilliefors test is significant at the 5% level, confirming problems of non-normality.

When the dependent variable is ranked or transformed into normal scores there is no longer any apparent problem of non-normality. Both standard tests on skewness and kurtosis are satisfac-tory and the Kolmogorov-Smirnov test statistic suggests normality (K-S greater than 5%).[19]

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[19] Other transformations in terms of powers, roots and logs were used in an attempt to convert the data to approximately normal. None of these transformations was able to correct for both skewness and kurtosis. Thus, the rank and normal scores approaches have advantages in this instance over other transformations. It should be noted that joint tests of skewness and kurtosis are sometimes thought to be biased (see Doornik and Hendry, 1994).

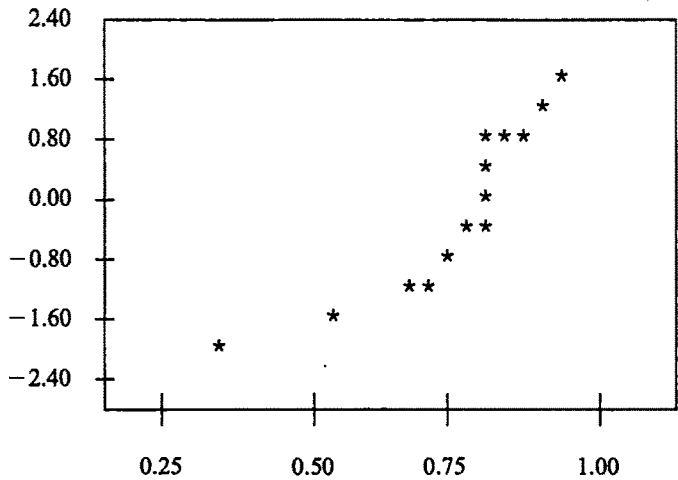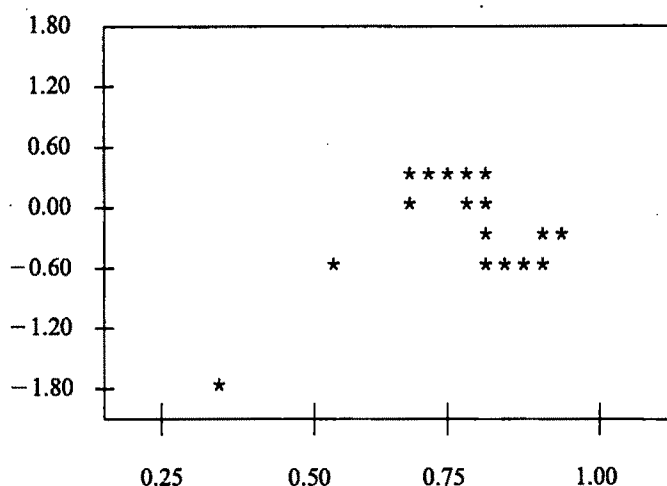**Figure 8**
Normal plot of the dependent variable (Saudi Arabia)

Figure 9
Detrended normal plot of the dependent variable (Saudi Arabia)

4.4. Independent variables

Regressors that have typically been found to be significant in similar disclosure studies on countries around the world were found not to be significant in the case of Saudi Arabia. The size variable chosen was in terms of share capital (Capital). Because of the uncertainty of the theoretical relationship between size and the dependent variable, it was decided, as one alternative, to transform dependent and independent variables. In addition, the extent of government holdings in listed companies (government investment) was thought to be a possible explanatory variable because the government would have access to inside information. It was therefore hypothesised that the greater the government holding, the lower the level of public disclosure in annual reports.

Model specification

The regression specification is:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \epsilon_i$$

where

Y = disclosure index scores

X_1 = government holdings in share capital

X_2 = share capital

ϵ = error term
i = 1, ... 33
β = parameters

The level of government holdings was found not to be significant in any of the models. With respect to the size variable, share capital, it was found to

Table 3
Descriptive statistics of the disclosure indexes - Saudi Arabia

| | | Data sources | | |
	Untransformed	Log odds ratio	Rank	Normal scores
Mean	0.766	1.278	17.000	0.000
Standard deviation	0.117	0.653	9.669	0.922
Minimum	0.333	−0.690	1.000	−1.890
Maximum	0.953	3.010	33.000	1.890
Skewness	−1.887	−0.411	−0.001	−0.001
S.E. Skewness	0.409	0.409	0.409	0.409
Kurtosis	8.206	5.870	1.799	2.513
S.E. Kurtosis	0.798	0.798	0.798	0.798
Z test - skewness	−4.619	1.005	−0.002	−0.002
Z test - kurtosis	6.520	3.596	−1.505	−0.610
Kolmogrov-Smirnov (Lilliefors- signif.)	0.000	0.000	>0.200	>0.200

be significant at the 5% level in the untransformed model, the log odds of the dependent variable model and when the dependent variable was transformed to normal scores. In the other two models, ranked transformation and all continuous variables transformed to normal scores, these two variables were found not to be significant (Table 4).

The constant term was found to be significant in the untransformed model, the log odds of the dependent variable model, and the rank transformation model. Thus, the coefficients attached to certain variables and whether they are significant depends both on the data and on the type of transformation undertaken.

In the case of Saudi Arabia, the measure of best fit used was again the MSE. The log odds ratio of the dependent variable had the lowest MSE (0.0119), followed by the normal scores of both the dependent and independent continuous variables (0.0128), the normal scores of the dependent variable (0.0283), the MSE based on the ranks with interpolation (0.0381), and finally by the unadjusted dependent variable (0.1239). The fact that the MSE of the regression based on an unadjusted dependent variable was substantially different from the others indicate advantages of other approaches, such as the normal scores method.

In terms of the coefficient of determination, the $\bar{R}^2$ was found to be very low using ranked data.

Using normal scores for both the dependent and independent variables (Model 5, Table 4) gives a negative $\bar{R}^2$ although the coefficient of determination itself was of course positive. The $\bar{R}^2$ based on transformation of the dependent variable into normal scores is highest (0.14626) followed by the untransformed model (0.09932), the log odds ratio transform of the dependent variable (0.09544), Rank Regression (0.00345), and finally the regression that uses transforms of both dependent and independent variables to normal scores (−0.01712).

5. Summary and conclusions

This paper has reviewed some possible transformations that attempt to deal with theoretical relationships that are not well known or where measures are merely proxies for underlying constructs. The transformations include Rank Regression in disclosure studies when dealing with non-linear and linear relationships when such relationships are, by hypothesis, monotonic.

The shortcomings have been identified and an extension based on normal scores proposed. The normal scores approach, like the rank method, preserves monotonicity and with non-linear relationships disperses the concentration of data. However, the normal scores method has a number

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Table 4
Regression analyses of determinants of disclosure scores by Saudi Arabian corporations

Independent Variable	Model				
	(1)	(2)	(3)	(4)	(5)
Government investment	8.896046E-04	0.005696	−0.118695	0.012505	0.028172
	(0.868)	(0.996)	(0.610)	(1.594)	(0.131)
Capital	−2.41870E-05	−1.36207E-04	−0.275854	-2.29157E-04	−0.225778
	(−2.194)*	(−2.214)*	(−1.451)	(−2.714)*	(−1.140)
Constant	0.776554	1.323254	19.671706	0.010300	−9.62725E-04
	(30.270)*	(9.242)*	(4.868)*	(0.052)	(−0.006)
MSE#	0.12390	0.01188	0.03805	0.02831	0.01276
$\bar{R}^2$	0.09932	0.09544	0.00345	0.14626	−0.01712
Standard error	0.11130	0.62118	9.65204	0.85232	0.93030
F	2.76438	2.68823	1.05539	3.74101	0.73065

The upper figures for each variable are coefficients and the lower figures are the t-statistics. The coefficients of the excluded dummy variables are all 1.00000 since they act as benchmarks for the included dummies.
* = significant at the 5% level.
# = $1/n \, (Y_i - \hat{Y}_i)^2$, see text for further discussion.
Model 1 Regression using untransformed data.
Model 2 Regression using the log odds ratio [ln(x/(1-x))].
Model 3 Regression using ranked data.
Model 4 Regression using a transformed dependent variable to normal scores.
Model 5 Regression using normal scores for the dependent and independent variables.

of advantages over Rank Regression, namely (a) that a normally distributed dependent variable implies the same property for the distribution of the errors (b) that the significance tests are meaningful and have greater power than when using ranks (c) the coefficients obtained when using the normal scores approach are more meaningful than for Rank Regression.

Some of the identified transformations were applied to two datasets of information disclosure in the annual reports of companies in Japan, a developed country, and Saudi Arabia, a developing country. Using two datasets has the advantage that the outcomes of transformations can be contrasted and are not specific to one dataset. This approach helps to highlight the point that the data should be examined in detail before deciding upon an appropriate statistical method. The models produced some differences in terms of significance of variables and magnitude of the coefficients. As a result, it is possible that biased estimates may occur and substantive errors could go unnoticed if the data is not analysed appropriately.

The important lesson to be learned from the two case studies is that the success of the transformations in improving the fit of the model is dependent on the structure of the data. In the case of the data on Japan, the MSE based on ranked data with interpolation was found to be best. In the case of the data on companies in Saudi Arabia, it was found that the log odds ratio of the dependent variable provided the best fit and using normal scores (both models) provided a better fit than using ranks.

In conclusion, the normal scores approach has theoretical advantages over the use of pure ranks although when applied to the two case studies there was no overwhelming case for one particular approach. This emphasises the point that it is important to examine the structure of the data and the relationships between the dependent and independent variables if errors in interpretation are to be avoided.

Appendix

Suppose data $X_1, X_2, ... X_n$ are ordered from smallest to largest to give the order statistics $X_{(1)}, X_{(2)}, ... X_{(n)}$. Following Lehman (1975) mapping the n ordered observations to a $N(0,1)$ distribution with density function $\phi(\chi)$ by taking the expected value of $X_{(i)}$ as the Normal Score as in

$$z_i = E_\phi \left[X_{(i)} \right] \qquad (1)$$

Since the natural estimate in (1) is difficult to compute for a given dataset an alternative Normal Score proposed by van der Waerden (1952, 1953) is to replace the expectations in (1) by

$$z_i = \phi^{-1} \left(\frac{i}{n+1} \right)$$

where $\phi^{-1}(\chi)$ is the inverse of the $N(0,1)$ cumulative density function. This method of obtaining Normal Scores is the approach adopted by SPSS.

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Book Reviews

The French Plan Comptable: Explanation and Translation. *Peter Standish.* Expert Comptable Media 1997. xxvi + 563 pp.

Peter Standish is a well-known authority on the French Plan Comptable, the accounting system that the state imposes on most French enterprises. He was the only person of English mother tongue to be asked to address the recent symposium hosted by the French Conseil National de Comptabilité to celebrate the 50th anniversary of the plan comptable. He probably said that the party was five years too late, as the origins of the plan go back to 1942—a fact which he established as a result of some painstaking and scholarly research, documented in one of the best articles to appear in *Accounting and Business Research* in recent years: 'Origins of the Plan Comptable Général', *Accounting and Business Research*, Autumn, 1990).

Now he has produced a massive tome on the subject. The book is enormous. It has over 500 large format (A4) pages and weighs over 1.5 kilogrammes (3 lbs 12 ounces to the Anglo-Americans). The author explains in the introduction why it is so long. The book is intended to be both a comprehensive reference work and an analysis of the plan comptable. The reference material includes an English translation of the major part of the text both of the Plan Comptable and of the more important laws and decrees, a full list of all relevant laws and decrees, much information about the numerous sectoral adaptations of the Plan Comptable, a great deal of detail about the taxation of enterprises, including examples of the various tax forms, and a glossary.

The reference material takes up more than two thirds of the book's content. Clearly, this is not a book to attempt to read from end to end starting at page 1—a fact discovered by your reviewer when he attempted this and fell asleep half way through Chapter 1! This is not to disparage the value of the reference material. You will find this book a valuable source of research material. This applies not only to the text of most of the Plan Comptable (which has not before been made available in English) but also to that of the other laws, including the rather mundane tax forms, which reveal much about the greatly discussed but rarely documented relationship between tax and accounting in France.

However, most readers of *Accounting and Business Research* will turn to this book, not to study its reference material, but for an explanation and analysis of the Plan Comptable, and so this review will concentrate on the 184 pages that meet this need.

On the first page of Chapter 1, the author presents the central objectives of the plan comptable as:
● to standardise the organisation of the individual enterprise accounting system;
● to standardise presentation by the enterprise of its assets and liabilities, financial position and profit or loss.

Three important points are established at the outset:
● The plan comptable is to do with standardisation—a matter that also interests British and American accountants. However, the French interest in the subject predates that of the Anglo-Americans by about a generation. As the author demonstrates in Chapter 2, the origins of the Plan Comptable go back to 1942, whereas the British and American standard-setting bodies can trace their origins only to 1970 (ASC) and 1959 (APB).
● A major concern of the Plan Comptable is the accounting system of the enterprise, a matter almost completely ignored by the standard setters of the UK and the US, who doubtless feel more at home with the plan's second concern—the presentation of the financial statements.
● The Plan Comptable is much more than a simple chart of accounts. The author likens it to an accounting manual with its extensive treatment of the functioning of the various accounts in the system.

The plan comptable's emphasis on systems for the processing of accounting data and for the preparation of financial statements is brought out in its very first paragraph. In this introductory paragraph, lip service is paid to the 'needs of diverse interest groups', but the overriding emphasis is on the processing of accounting information: on control methods, common terminology and, above all, respect of principles. Whose principles? Naturally those of the plan comptable.

The author analyses the implications of this approach in a most interesting manner, likening the Plan Comptable to a national accounting language, with its own dictionary (the defined terminology) and grammar (the rules on the functioning of accounts and on the preparation of financial statements); the Conseil National de la Comptabilité is the guardian of this language—the

Academie Française of accountancy. The advantages of a common language are more effective communication between parties (both within the accountancy profession and between accountants and others) and considerable economy in the training of accountants and the practice of accountancy. There would appear to be two disadvantages:

● There is a danger of the language becoming rigid and fossilised, unadapted to modern conditions. In the same way that the Academie Française seeks to prevent the French people from using such succinct and useful expressions such as 'le weekend', possibly the Conseil National de la Comptabilité may not be able to adapt the Plan Comptable to changes in the accounting environment, for example the introduction of new complex financial instruments. The author concedes that 'the plan comptable appears somewhat behind the times in terms of recognition and utilisation of many contemporary financial terms', but points out that it has successfully adapted itself in some areas, notably in the new accounting code for UCITS (mutual funds and unit trusts), which includes such innovations as valuing securities at market value and using complex mathematical models (such as the Black-Scholes formula) to measure risk.

● A centrally imposed accounting language is incompatible with the freedom of the individual enterprise to design its accounting system and prepare its financial statements in the way that best meets its own needs. This is undoubtedly true. The proponents of the plan comptable make two points in its defence: the advantages to society as a whole outweigh the disadvantages to the individual enterprise; and the plan comptable is not a monolithic inflexible instrument. It is an important feature of the plan comptable that it should be adapted to the different needs of particular economic sectors. This is an aspect of the plan comptable of which most Anglo-American accountants are completely ignorant. To counter this ignorance, large sections of Chapters 3 and 5 are given over to a description of the various sectoral plans, and the appendix lists no fewer than 57 sectoral plans which range from advertising agencies to wine merchants.

It is a question of whether one standardises processes or outcomes. The French emphasise processes: the Anglo-Americans outcomes. The author comments that acceptance of user needs as the overriding objective for financial statements probably directs greater attention to issues of measurement and valuation and less to those of classification and systems conformity. British and US standards are full of the former but virtually ignore the latter, whereas with the Plan Comptable the positions are reversed. However, giving priority to user needs raises problematic issues of identifying users, specifying the role of accounting information in user decision models and resolving conflicts between competing priorities. In bypassing these issues, the plan comptable avoids giving hostages to fortune, but is consequently positioned at an instrumental level rather than a conceptual level.

The above analysis explains why a study of the plan comptable is valuable, even for Anglo-Americans steeped in the dogma that accounting must be outcome-oriented. It confronts them with a fundamentally different approach to accounting and forces them to undertake the thoroughly healthy activity of re-examining their own approach. This is quite apart from the fact that knowledge of the Plan Comptable is vital for a complete understanding of financial reporting and accounting in France.

The book explains the Plan Comptable in the following sequence: Chapter 1 starts with a brief overview, which is followed by a detailed but rather tedious explanation of the two principal elements: the functioning of the accounts (including the coding system) and the presentation of the financial statements. Chapter 2 outlines the history of the Plan Comptable from 1942 to the present day, including the analysis of its origins, as already set out in the article referred to at the beginning of this review. Chapter 3 deals with the laws and decrees that govern the Plan Comptable; this chapter includes some 20 pages on the tax regulations. Chapter 4 covers the institution responsible for the development and maintenance of the plan comptable: the Conseil National de la Comptabilité (National Accounting Council). It includes a most interesting analysis of the relative influence of the various groups that are represented on the Council.

Chapter 5 is somewhat a hotchpotch. It contains some 12 pages of straightforward analysis of French consolidated accounts and some 10 pages on the French accounting and auditing professions: both sections are extremely interesting. They are followed by a section of some 40 pages on the various sectoral adaptations of the plan comptable, which is essentially reference material.

Chapter 6 is both the shortest and the most interesting chapter in the whole book. It presents the characteristics of the French accounting model, and also includes an analysis of the reform of this system, which started in 1996 and has still to be completed. Your reviewer found this chapter most stimulating. Much of the discussion in the earlier part of this review on an accounting language and on process versus outcome is based on this chapter. Hence the reader who is pressed for time should start with this chapter.

To summarise, the work is an extremely valuable reference book and research tool that makes available to the English-speaking world much

material not hitherto accessible. However, the work is far more than that. The author has used his position as an outside observer of the French scene to produce the best analysis, explanation and critique of the Plan Comptable that exists in any language.

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The History of the German Public Accounting Profession. *H. B. Markus.* Garland Publishing, New York and London, 1997. xvi + 354 pp. ISBN 0-8153-3010-3.

Although not a verbatim translation, this is the English version of *Der Wirtschaftsprü- fer–Entstehung und Entwicklung des Berufes im na- tionalen und internationalen Bereich*, published in 1996 by C. H. Beck, Munich. It now not only forms part of a series published by Garland, en- titled 'New Works in Accounting History', but is also eighth in *The Monograph Series of The Acad- emy of Accounting Historians*, edited by O. Finley Graves. There is a preface by Graves and a fore- word by John Williams, former director of inter- national affairs, Chartered Accountants Joint International Committee. An introduction by the author clarifies the objectives and scope of his work, and includes his personal background: Mar- kus by profession is an accountant, both a member of the ICAEW and a Wirtschaftsprüfer (German public accountant), not an historian.

The book takes a chronological approach to its subject matter and contains five chapters each dealing with a particular period in the history of the German accountancy profession. Chapter 1 ex- amines the events leading to the formation of the Wirtschaftsprüfer profession in 1931 around the time that statutory audits were introduced for large public limited companies. Chapter 2 concen- trates on the early development of the profession up to 1933, while Chapter 3 deals with the profes- sion under the National Socialists, 1933–1945. Chapter 4 is concerned with the period from the end of the Second World War, when Germany was divided into four occupational zones and the profession fragmented, to 1961 when the profes- sion was regulated on a uniform federal basis. Fi- nally, Chapter 5 covers the period from 1961 to 1996.

In addition to the main text there are five ap- pendices, the third and fourth of which are quite substantial: a glossary of German terms, a chro- nology, the activities of British and US firms in Germany up to the 1950s (new to this edition), the evolution of the Big Six firms, and a summary of the auditing profession in other European countries.

The structure of the accountancy profession in the British Isles is a mystery to many, with its six chartered bodies and a similar number of non- chartered associations. This can only be fully un- derstood by examining its origins and develop- ment, and the same holds true for the German profession, which has possibly an even more com- plex history. Markus explains the difference be- tween the Institut der Wirtschaftsprüfer (IdW) and the Wirtschaftsprüferkammer (WPK), and how and why each of these bodies came into being.

The IdW is an association formed under civil law and membership is voluntary but restricted to Wirtschaftsprüfer, while the WPK was established as a corporation under public law and membership is mandatory, since it is the regulatory body, for all Wirtschafstprüfer and licensed auditors. Also explained is why there are both Wirtschaftsprüfer and licensed auditors. The latter are members of a body, regarded as a second tier of the auditing profession, entry to which had ceased in 1961, only to be re-opened following the implementation of EC Directives in 1986; licensed auditors are enti- tled to examine the accounts of medium-sized pri- vate limited companies.

A recurrent theme of the book is the important role played by Wirtschaftsprüfungsgesellschaften (auditing companies), many of which were origin- ally owned by the banks and some by the state. These companies caused resentment among sole practitioners and raised questions over the inde- pendence of appointments. This is a problem the British profession could have faced if a corporate life assurance society had succeeded in its attempt in 1925 to be allowed, among other things, to carry out audits. The application was denied fol- lowing objection by the ICAEW, and as a conse- quence the Companies Act 1928 prohibited cor- porate bodies from acting as auditors (Simmonds, 1985). Attitudes had changed by the time the Companies Act 1989 permitted incorporation for auditors.

A great benefit of this book is that it allows comparisons and contrasts with the greatly differ- ent history of accountancy in Anglo-Saxon coun- tries. Markus himself does this to a certain degree; at the end of Chapter 1 the evolution of the German profession is compared with that in Scot- land, England, Canada and the US up to 1931. He concludes that in Germany, as in other countries, apart from Scotland, 'there were struggles for su- premacy between different organisations and in- terest groups in the formative stages of the estab- lishment of their professions' (p. 27).

There the similarity ends: 'Unlike the other pro- fessions which evolved in times of economic growth, the German profession was created barely a dozen years after a lost world war, some seven years after the worst inflation of modern times and in the midst of a catastrophic world economic cri-

sis; all of these conditions led to a high degree of political instability, the consequences of which were to hang as a dark cloud over the new profession for more than the first decade of its life' (pp 27–8).

Further comparisons are made at the end of the final chapter. These concentrate on five issues: the structure and size of the profession (in Germany it is relatively small); the education of accountants (in Germany this takes many years, so accountants qualify later in life); advertising (German accountants are not allowed to); accountants' liability (German auditors' liability for negligence in statutory audits is limited); and the challenges facing the profession.

Markus has compiled a well-researched, interesting and commendable account of the history of the German profession.

Reference

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University of Kent at Canterbury   Peter Boys

Research Methods for Judgment and Decision Making Studies in Auditing. *Ken T. Trotman.* Coopers & Lybrand/AAANZ, Australia, 1996, viii + 155 pp. $Aus60 (including postage).

This is the third in a series of four Accounting Research Methodology Monographs published by Coopers & Lybrand and the Accounting Association of Australia and New Zealand (Brown 1994; Brownell, 1995; Weber, 1997) which promise to find their way on to the reading lists of most, if not all, Research Methods in Accounting courses. In his review of the second monograph Otley (1996, p.365) stated: 'This is an excellent book which should be required reading for every doctoral student in management accounting, and for many of their supervisors as well.' Similar remarks apply to *Research Methods for Judgment and Decision Making Studies in Auditing*.

In the words of the author, 'This monograph examines research methods for judgment and decision making (JDM) research in auditing ... In particular [it] considers research methods for experimental studies on auditor judgments' (p.1). While this reflects the book's focus, it understates its contribution to the auditing research literature. In essence, it constitutes a concise, clear and very readable manual of JDM research in auditing. Written by one of the best known experts in the field, the monograph is instructive and insightful for both the novice embarking on research in auditor judgment and for the highly experienced JDM researcher.

Among other things it provides a wide ranging review of the literature (the bibliography extends to nearly 16 pages), it examines numerous and varied studies in auditor judgment and the different research methods adopted, and explains how research in the area has progressed. It also warns of pitfalls to be avoided, demonstrates how 'accepted' conclusions of extant research may be challenged and used as a springboard for alternative avenues of enquiry, and identifies opportunities for future research and sources of further research ideas.

The monograph has five chapters and an appendix. The introductory first chapter builds a foundation for the rest of the book. It sets out the aims of the monograph, notes the importance of judgment in the audit process and specifies the key objectives of JDM research, namely, to evaluate the quality of auditor judgments; to describe how auditors make judgments and which factors affect judgment performance; and to test theories of the cognitive processes which produce auditors' judgments and decisions. The chapter also provides an overview of methods used for JDM. In particular, it explains the meaning of, and difference between, laboratory and field experiments and experimental and quasi-experimental designs.

The second chapter focuses on experimental design. It reviews the purposes of experimental design, outlines the types and characteristics of independent and dependent variables commonly used in auditor judgment research, and discusses alternative types of experimental design. It explains the difference between between-subjects and within-subjects designs and examines three types of experimental design used in audit judgment studies—post-test only control group design, pretest/post-test control group design and, more especially, factorial designs. In each case the experimental design is explained, its advantages and disadvantages are reviewed, and examples of studies using the design are discussed.

Chapter 3 has the twin objectives of providing (a) an overview of the types of auditor judgment studies conducted over the past couple of decades and (b) guidance on how to carry out this type of research. It describes the Brunswik Lens Model (which has provided a framework for much of the research on auditor judgments) and examines six criteria used by researchers to evaluate auditor judgments, i.e. accuracy, consensus, cue usage, judgment stability, self-insight and calibration. However, the chapter is largely devoted to discussing various types of JDM studies in auditing—policy capturing, heuristics and biases, information search, hypothesis generation and protocol analysis, and determinants of judgment performance (in particular, knowledge and memory, environmental factors, and motivation). Each judgment criteria and type of JDM study is clearly explained, its advantages and disadvantages (and/

or significance) are considered, and illustrative examples are provided.

In the fourth chapter, the meaning and importance of internal and external validity of experiments are explained and the main threats to internal validity—and counters to such threats—are discussed. Nine potentially confounding variables are described (maturation, history, testing, subject mortality, instrumentation, selection, statistical regression, imitation of treatments, and resentful demoralisation of respondents) and six methods for controlling for these extraneous variables are explained (randomisation, consistency of conditions, matching, counterbalancing, control of subject variables, and control of experimenter bias). After noting that external validity refers to generalising across people, settings and time, the main types of interactions are discussed, namely, treatment/selection interactions (population validity), treatment/setting interactions (ecological validity), and treatment/history interactions (temporal validity). This is followed by a section examining design issue choices that can affect the validity of the experiment; those considered are the use of control groups, manipulation checks, controlled versus non-controlled settings, the use of computers in experimental design, subject selection and incentives, and ceiling effects.

In the chapter summary, the author states: 'One of the most important trends in auditing has been the recent emphasis on improving external validity ... Many of the most influential papers have been high on internal validity but often not strong on external validity. Over time these initial studies have then been extended in more complex settings to increase the external validity' (pp. 95–96). This leads neatly into the final chapter of the monograph in which five areas of the audit judgment literature are used to illustrate how research progresses. The five areas are: consensus and cue usage for internal control judgments; experience effects; information choice and information processing; order effects; and group decision making. For each research area, the reasons for its selection are explained and the incremental advancement of research is clearly demonstrated.

The monograph concludes with an appendix which should prove invaluable not only to those interested in JDM studies but to all researchers within the domain of auditing. It sets out 19 examples of studies since 1990 that have included a limitation section in their paper. Each provides ideas for future research. What a gold mine for doctoral students!

Given its subject matter, it is inevitable that this monograph contains considerable technical material and jargon. This applies especially to Chapters 2 and 3. Notwithstanding the readable style with which the book has been written, it is likely that those unfamiliar with experimental research (and the attendant terminology) will require multiple readings before they are able to comprehend fully and internalise its content. While not discounting the enormity of the task, I believe that had a glossary of all the technical terms used in the book been provided, this would have been of great assistance to those not well acquainted with the jargon. It would also have overcome the problem encountered in a few instances of technical terms being used prior to their being defined or explained.

Apart from this minor proviso, this monograph is an excellent source of reference for all researchers in the auditing arena—and for many beyond it. While focusing on research methods for JDM studies in auditing, much of its content has relevance for the broad spectrum of research in auditing as well as for JDM studies in non-audit areas. Among its other notable attributes, the book renders a specialist area of study accessible to the general body of auditing researchers, it provides concise, clear, yet detailed guidance on how to conduct JDM research in auditing (and how to avoid many of the pitfalls), and it identifies opportunities for future research and sources of further research ideas.

In summary, it is a book that is difficult to recommend too highly to auditing doctoral students and the auditing research community generally.

Cranfield University   Brenda Porter

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Human Resource Accounting: with special reference to charitable institutions. *Malayendu Saha.* Discovery Publishing House, New Delhi, 1997. xii+177pp. Rs.300/-.

This book is based on the author's PhD thesis at the University of Calcutta. In essence, it applies the US literature on human resource accounting of the early 1970s to a religious charitable institution in West Bengal. The rationale for the study is that conventional accounting for non-profit organisations, with added emphasis to that for profit-seeking organisations, does not adequately account for services rendered or for resources consumed; this is because the services fundamentally depend on unpaid, or nominally-paid, volunteers. The solution to this perceived problem is to

supplement traditional financial statements with monetary measures of human resources consumed.

Chapter two reviews the many valuation models offered in the aforementioned literature, and chooses the Lev-Schwartz model (*Accounting Review*, January 1971: 103-112) on the main ground that, in contrast to most of the others, it is 'operationally feasible' (p37); this model requires the capitalisation of the future earnings of employees. By definition, these earnings are not directly observable in this case study and so notional earnings are substituted, based on those that could have been earned in an equivalent government-run institution. The chapter also reviews practice in India in relation to human resource accounting in public and private sector organisations, which shows that the Lev-Schwartz model is the one most commonly used.

Chapter three synthesises the nature of non-profits, the part of the FASB's conceptual framework project that relates to non-business organisations, and US accounting practice (at least before the 1993 issue of SFASs 116 and 117, which radically changed previous practice).

Chapter four develops additional accounts and financial statements to reflect human resources. An operating statement is suggested that reports the sacrifices made by funding agencies, employees and others, and the balance sheet includes stocks of human resources. A web of ratios is then offered that combines traditional accounting ratios with these additional measures of human resources; a fundamental one is 'Net service to society' as a percentage of net assets (including human resource assets).

Chapters five and six generate the additional accounts and calculate all the new ratios for the chosen charitable institution. These chapters demonstrate the operational feasibility of the proposals. The potential use of such new data is not considered in detail, but the explicit purpose of them is for potential and actual benefactors to compare performance across non-profit organisations.

In many ways, the US academic and professional literature that informs this book is dated. However, the issue remains real enough: whether, and if so how, accounting should reflect the work of volunteers, especially in non-profit organisations. This book may be of interest in detailing, for a real case and using numbers, one way this might be done.

University of Birmingham   Rowan Jones

Editorial Data

CONTEMPORARY ACCOUNTING RESEARCH/RECHERCHE COMPTABLE CONTEMPORAINE

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Watts, R. L. and Zimmerman, J. L. (1986). *Positive Accounting Theory.* Englewood Cliffs, NJ: Prentice-Hall.

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The impact of constructive operating lease capitalisation on key accounting ratios

Vivien Beattie, Keith Edwards and Alan Goodacre*

Abstract—Current UK lease accounting regulation does not require operating leases to be capitalised in the accounts of lessees, although this is likely to change with the publication of FRS 5. This study conducts a prospective analysis of the effects of such a change. The potential magnitude of the impact of lease capitalisation upon individual users' decisions, market valuations, company cash flows, and managers' behaviour can be indicated by the effect on key accounting ratios, which are employed in decision-making and in financial contracts. The capitalised value of operating leases is estimated using a method similar to that suggested by Imhoff, Lipe and Wright (1991), adapted for the UK accounting and tax environment, and developed to incorporate company-specific assumptions. Results for 1994 for a random sample of 300 listed UK companies show that, on average, the unrecorded long-term liability represented 39% of reported long-term debt, while the unrecorded asset represented 6% of total assets. Capitalisation had a significant impact (at the 1% level) on six of the nine selected ratios (profit margin, return on assets, asset turnover, and three measures of gearing). Moreover, the Spearman rank correlation between each ratio before and after capitalisation revealed that the ranking of companies changed markedly for gearing measures in particular. There were significant inter-industry variations, with the services sector experiencing the greatest impact. An analysis of the impact of capitalisation over the five-year period from 1990 to 1994 showed that capitalisation had the greatest impact during the trough of the recession. Results were shown to be robust with respect to key assumptions of the capitalisation method. These findings contribute to the assessment of the economic consequences of a policy change requiring operating lease capitalisation. Significant changes in the magnitude of key accounting ratios and a major shift in company performance rankings suggest that interested parties' decisions and company cash flows are likely to be affected.

1. Introduction

The use of leasing as a form of asset financing has been growing worldwide during the past twenty years. In the UK, leasing represented 15.8% of the total investment in equipment by 1994 (Finance and Leasing Association, 1994). Although published information does not permit the calculation of a comprehensive lease ratio (capitalised value of leased assets to total assets), a crude indication of the overall significance of leasing across asset categories can be obtained from the ratio of the *annual* lease payment commitment to total assets. An analysis of data extracted from the Extel Company Analysis database for the population of UK listed companies (n = 2,288) shows this 'annual' lease ratio to be 0.76% in 1994. Moreover, the figures

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for operating and finance leases are 0.74% and 0.04%, respectively, indicating that the annual operating lease commitments are 18 times that of finance leases.

Prior to 1984, UK leasing growth could be attributed to two main factors. First, the availability of 100% first year allowances meant that lessees with insufficient profits to utilise this allowance through asset purchase could instead lease the asset and pay rentals which reflected the tax saving made by the lessor. Second, the off-balance sheet nature of lease transactions was attractive since gearing levels are not adversely affected. The Finance Act 1984 provided for the gradual removal of first year allowances, and SSAP 21 required the capitalisation of finance leases by lessees from 1987. Despite these events, leasing in the UK has not declined, the level remaining approximately constant since 1984 (Finance and Leasing Association, various years). In particular, this may be due to the design of lease contracts which avoid being classified as finance leases. However, there are clearly also other significant advantages (of both a general and a company-specific nature) from leasing.

The US was the first country to adopt a lease accounting standard, SFAS 13 (FASB, 1976). Prior to this, most lease payments were simply

charged to the profit and loss account as incurred. Leases were classified into two types, those which transfer to the lessee substantially all the risks and rewards of ownership (known as capital or finance leases) and those which do not (known as operating leases). SFAS 13 required capital leases to be capitalised, i.e. a liability is created in the lessee's balance sheet reflecting the lessee's future obligations under the lease, and a corresponding asset is created reflecting the lessee's rights in the asset. The concepts and definitions of lease accounting introduced by SFAS 13 were substantially adopted by many countries (including the UK, Canada, Australia, and New Zealand) and the IASC, although the US standard is the most prescriptive. In the UK, the growth in leasing from the mid-1970s and the collapse of Courtline were contributory factors in the move towards lease regulation. SSAP 21 *Accounting for leases and hire purchase contracts* was introduced in 1984 and its full lessee provisions were effective from 1987 (ASC, 1984).

Standard-setters in the UK, US, Australia, and New Zealand, together with the IASC, have recently published a discussion paper: *Accounting for leases: a new approach*, which proposes that *all* leases be capitalised (McGregor, 1996). It is likely that a new UK lease accounting standard will soon be introduced based upon this proposal, since this would resolve the current conflict which exists between SSAP 21 and FRS 5 *Reporting the substance of transactions* (ASB, 1994). FRS 5 (para. 4) defines liabilities as 'an entity's obligations to transfer economic benefits as a result of past transactions or events', from which it appears to follow that all ongoing lease contracts give rise to liabilities and should, therefore, be reflected in the balance sheet. In recognition of this conflict, FRS 5 states that the standard that contains the more specific provisions relating to a transaction should be applied; in the case of leases, this is in general SSAP 21.

Given the economic significance of leasing, a change in lease regulation which requires the capitalisation of operating leases is likely to have a significant impact on the accounting numbers of many companies. This could impact, in turn, upon a wide variety of individual users' decisions (e.g. credit rating, loan assessment, risk evaluation), aggregate investor decisions (i.e. share prices), company cash flows (via contracts based on accounting numbers which apply 'rolling' GAAP), and managers' behaviour (i.e. financing decisions and earnings management). See, for example, Taylor and Turley (1985), Garrod (1989), Citron (1992), and Breton and Taffler (1995) for relevant UK studies. The impact of such a regulatory change on the accounting numbers is captured effectively by observing the change in key accounting ratios. Financial analysis textbooks in both the UK and the US indicate that ratios are used widely by in-

vestment analysts and loan officers as decision tools (Foster, 1986; Bouwman et al., 1987; Cohen et al, 1987; Holmes and Sugden, 1995; and Rees, 1995). Moreover, a UK questionnaire survey has shown that 70% of analysts use financial ratios extensively in forecasting earnings (Arnold and Moizer, 1984), while a US survey found that gearing was crucial to loan officers' lending decisions (Gibson, 1983).

Thus, the principal objective of this paper is to provide evidence which will assist in assessing the economic consequences of a change in the regulation of lease accounting, by estimating the impact on key accounting ratios of the requirement to capitalise all non-cancellable operating leases by lessee companies. This paper, therefore, represents policy-relevant, ex ante research in support of the standard-setting process of the type advocated by Schipper (1994). To achieve this objective, a comprehensive database of operating lease information is created from published corporate annual reports, and operating leases are capitalised using an amended version of the method proposed by Imhoff, Lipe and Wright (1991) (hereafter ILW).

The remainder of this paper is structured as follows. Section two provides a summary of the accounting regulation salient to leases, reviews the existing evidence concerning the impact of lease capitalisation on accounting ratios, and the ILW capitalisation procedure. The third section describes the methods used. Results are presented and discussed in section four. The final section summarises and concludes the paper.

2. Literature review

2.1. Lease regulation

In general, the trend in lease accounting regulation has been from the footnote disclosure of obligations to the capitalisation of these obligations (and the related asset) in the balance sheet. A summary of the regulatory pronouncements in the UK and elsewhere which have affected lease accounting in the UK is given in Figure 1. This figure shows that the classification rules for finance leases are more stringent under SFAS 13 than SSAP 21. It is therefore to be expected that, *ceteris paribus*, operating leases will represent a larger proportion of leases in the UK than in the US, since preparers of accounts may prefer leases to be classified as operating due to the more favourable effect on gearing ratios, in particular. Any further regulatory change requiring the capitalisation of operating leases will, consequently, have a greater impact upon the accounting numbers and key accounting ratios in the UK.

A recent analysis of UK financial reporting practice with respect to leases shows that considerable variation exists, particularly in disclosure lev-

Figure 1
Chronology and content of regulatory pronouncements affecting lease accounting in the UK

US

ASR 147 (SEC, 1973)

Required footnote disclosures in 10-K reports.

Opinion 13 (APB, 1973)
Suggested the disclosure of the present value of gross minimum rental commitments.

SFAS 13 (FASB, 1976)
Effective for leases entered into on or after 1 January 1977. Capital lease defined as one under which any of the following four conditions is met:
• the present value at the beginning of the lease term of the payments not representing executory costs paid by the lessor equals or exceeds 90% of the fair value of the leased asset;
• the lease transfers ownership of the asset to the lessee by the end of the lease term;
• the lease contains a bargain purchase price (i.e., an option to buy);
• the lease is equal to 75% or more of the estimated economic life of the leased asset.
Leases which do not satisfy *any* of these conditions are classed as operating leases.
Required the capitalisation of capital leases by lessee with operating lease payments reported as a profit and loss account charge, and disclosure of *total* minimum future payments under operating leases with remaining terms of more than one year (reported separately for each of the next five years and combined thereafter).

UK

ED 29 (ASC, 1981)
Proposed the capitalisation of finance leases by lessors.

SSAP 21 (ASC, 1984)
Effective for lessors for accounting periods beginning on or after 1 July 1984; full provisions effective for lessees for accounting periods beginning on or after 1 July 1987, with disclosure requirements effective for accounting periods beginning on or after 1 July 1984. Finance lease defined as one which in substance passes over to the lessee substantially all the risks and rewards of ownership. A present value test is provided to aid classification: a lease is presumed to be a finance lease if the present value at the beginning of the lease term of the minimum lease payments, discounted at the interest rate implicit in the lease, amounts to substantially all (normally 90% or more) of the fair value of the leased asset (the '90% test').
Other leases are classed as operating leases.
Required the capitalisation of finance leases by lessees, with operating lease payments charged to the profit and loss account on a straight line basis over the lease term (analysed between hire of plant and machinery and other operating leases). Also required the disclosure of *next year's* minimum future payments under operating leases, analysed according to the period in which the annual commitment expires (those expiring next year, within the second to fifth year inclusive, and over five years from the balance sheet date), further analysed between land and buildings and other operating leases.

TR 664 (ICAEW, 1987)
Encourages the consideration of aspects of the lease other than the 90% test in classifying leases.

FRS 5 (ASB, 1994)
Requires the consideration of all aspects of transactions in determining the appropriate accounting treatment, and so would appear to require recognition of assets and liabilities to the extent that risks and rewards have been transferred. The apparent conflict between SSAP 21 and FRS 5 is resolved by an explanation that the standard containing the more specific provisions should be applied and that, *in general*, these are contained in SSAP 21.

International

IAS 17 (IASC, 1982)
Effective for accounting periods beginning on or after 1 January 1984. This standard is general in approach and its disclosure requirements are less detailed than for either SFAS 13 or SSAP 21. Compliance with SSAP 21 ensures compliance with IAS 17 in all material respects.

els (Loveday, 1995). First, some companies charge operating lease rentals to the profit and loss account as incurred, contrary to SSAP 21, while others do not state the basis used. Second, the operating lease rental asset categories stipulated by SSAP 21 are not always followed. Third, many companies do not disclose either the method used to allocate finance lease rentals between capital and interest or the basis on which leased assets are depreciated. Finally, in response to FRS 5, five FTSE 100 companies have chosen to reclassify operating leases as finance leases (Company Reporting, 1995).

2.2. The impact of lease capitalisation on accounting ratios

The first published study of the impact of lease capitalisation on accounting ratios was conducted by Nelson (1963), who examined the effect of lease capitalisation on the debt-equity ratio of eleven US companies. He found a significant change in the rankings of the companies after capitalisation compared to before capitalisation. Fifteen ratios were calculated for each company, and in 56% of cases a change in rank of two or more places occurred. Ashton (1985) extended Nelson's study in a UK context, recognising that the impact of lease capitalisation will affect five accounting numbers: interest charges, depreciation, fixed assets, accumulated depreciation, and debt. The resulting impact on key ratios will depend upon the relationship between the capital element in the lease rentals (which rises over time) and the depreciation charged on the leased asset. This depends, in turn, upon the asset's estimated life, the primary lease term, and the method of depreciation.

Ashton identified two scenarios. First, where the primary lease term is sufficiently *shorter* than the estimated life of the asset, he argued that depreciation would generally be less than the capital repayment element of the lease rentals, and so reported profits and capital employed would initially rise. However, this will only occur if depreciation is based on the estimated life of the asset. If, as SSAP 21 requires for finance leases, it is based on the *shorter* of the asset life and the lease period, then depreciation will generally exceed the capital repayment element of the lease rentals, and reported profits will initially fall. This also applies for Ashton's second scenario, where the primary lease term *equals* the asset life (1985: 233–234).

Ashton (1985) estimated the effect of *finance* lease capitalisation on six ratios for 23 companies. He found only the individual reported results for the gearing ratio to be affected significantly. All Spearman rank correlations between pre- and post-capitalisation ratios were greater than or equal to 0.90, from which he concluded that inter-firm comparisons of performance would not be affected significantly by capitalisation. He cautioned, however, that his sample was small and potentially unrepresentative.

More recently, in a pioneering study, ILW (1991) developed a method for the constructive capitalisation of *operating* leases, used to estimate the impact of operating lease capitalisation on two ratios (return on assets and debt to equity) for 14 US companies (seven matched industry pairs, selected to represent high and low operating lease use). They find material differences in the ratios for both 'high' and 'low' lessees, concluding that operating lease capitalisation can materially affect inter-firm comparisons of key financial statement ratios. (Subsequent to the completion of this study, ILW published a paper which explored the income effects (Imhoff, Lipe and Wright, 1997).)

The key features of these three studies, each of which is based on a small, non-random sample, are summarised in Table 1. The impact of *operating* lease capitalisation does appear to alter key ratios significantly in the US, although the impact on ranking was not explored explicitly. The impact of operating lease capitalisation has, to date, not been explored in the UK setting.

2.3. ILW capitalisation procedure

The basis of the procedure developed by ILW (1991) for the US reporting environment is the schedule of minimum total future operating lease payments disclosed by US companies in a note to the financial statements. The total commitment is analysed by time period (amounts payable in each of the next five years and after five years). In this paper, ILW focus on the balance sheet effects of operating lease capitalisation, assuming that the income statement effects are negligible.

The accuracy of the procedure is limited by the availability of public domain data. Thus, based upon a detailed examination of only one company (McDonalds Corporation), ILW develop the following six uniform assumptions for general application. Estimation of the present value of the unrecorded lease liability depends critically upon assumptions regarding the appropriate interest rate and the average *remaining* life of leases where this life exceeds five years. First, ILW assume that the appropriate interest rate is 10% for each company. This is conservative, since the historical interest rate on McDonalds' secured long-term debt, based on the 1988 debt footnote is 9%. Second, ILW assume that the average remaining life of the operating leases is 15 years since, in McDonalds case, this figure produces a smoothly decreasing schedule of minimum future cash flows as at 1988, which is the typical pattern. Third, the assumption of year-end cash flows provides a further built-in conservative bias.

Table 1
Summary of empirical studies of the impact of lease capitalisation on accounting ratios

Study	Country	Sample size and type	Ratios examined	Findings	Conclusions
Nelson (1963)	US	11 companies	15 ratios, including debt/equity	Some ratios quite substantially affected, producing markedly different company rankings	Inter-firm comparisons of some ratios inaccurate and misleading without lease capitalisation
Ashton (1985)	UK	23 companies from 300 in the Survey of Published Accounts 1983/84 which gave sufficient information to isolate effect of *finance* lease capitalisation	Return on shareholders' funds; return on capital employed; profit margin; asset turnover; interest cover; gearing	Difference between pre- and post-capitalisation ratios significantly different for only gearing (significance level not reported); Spearman rank correlation between pre- and post-capitalisation ratios lowest for gearing at 0.90, which is still 'high'	Inter-firm comparisons of performance not significantly affected by finance lease capitalisation
Imhoff, Lipe and Wright (1991)	US	Seven pairs of companies from different industries, matched on size but with different *operating* lease use	Return on assets (ROA); debt/equity (D/E)	Average decrease in ROA: - 'high' lessees 34% - 'low' lessees 10% Average increase in D/E: - 'high' lessees 191% - 'low' lessees 47%	Operating lease capitalisation can materially affect inter-firm comparisons of key financial ratios

Estimation of the present value of the unre-corded lease asset requires further assumptions to be made regarding the weighted average *total* lease life and the depreciation method that would be used. Figure 2 demonstrates that the relationship between asset value and lease liability depends on the proportion of the lease which has expired. The model assumes that (i) straight line depreciation is used for all assets, (ii) the capitalised asset and the capitalised liability both equal 100% of the present value of the future lease payments at the beginning of the lease, and (iii) the capitalised asset and the capitalised liability both equal zero at the end of the lease. ILW also *implicitly* assume a standard, simple, lease payment profile with no initial costs, nor reverse premiums, and no contingent rental payments.

The ratio of asset to liability (asset proportion) can be expressed as:

$$\frac{PV_A}{PV_L} = \frac{RL}{TL} \times \frac{PVAF_{r\%,TL}}{PVAF_{r\%,RL}} \qquad (1)$$

where:
PV_A = present value of unrecorded asset,
PV_L = present value of unrecorded liability,
RL = remaining lease life,
TL = total lease life, and
$PVAF_{r\%,n}$ = present value annuity factor for £1 at r% for n years.

ILW calculate the asset proportion for 105 dif-ferent combinations of the three variables: total lease life (years) = 10, 15, 20, 25, and 30; interest rate = 8%, 10% and 12%; and total lease life ex-pired (%) = 20, 30, 40, 50, 60, 70, and 80. They show that the asset proportion lies between 60%

Figure 2
Relation between the unrecorded operating lease asset and unrecorded operating lease liability
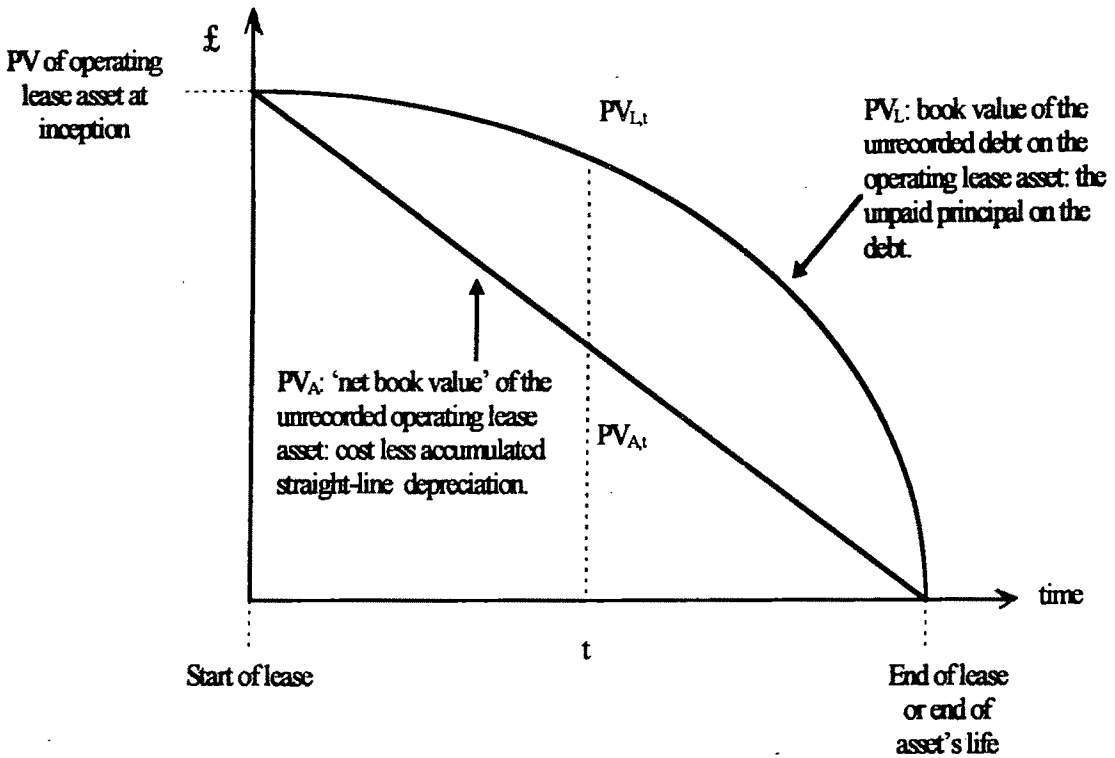
Source: Based on Figure 1 in Imhoff, Lipe and Wright (1991: 57)

and 80% in 51 (49%) cases. Based on this, their fourth assumption is that an appropriate approximation for the asset proportion is 70%.

The income statement effect of operating lease capitalisation is shown in Figure 3, which compares the annual profit and loss charge under both accounting treatments over the lease/asset life. In the early stages of a lease's life, the profit and loss account charge under capitalisation (i.e., depreciation plus interest) exceeds the charge under non-capitalisation (i.e., lease rental, OLR). The difference gradually declines, then reverses. ILW assume that a stable lease portfolio exists (i.e., on average, 50% of lease life remains) and that this average remaining age approximates to the point of indifference between the impact of capitalisation and non-capitalisation on the profit and loss account. This justifies ILW's fifth assumption that the effect on the current period's net income is zero; it is also consistent with the 70% asset/liability relationship.

The difference between asset value and liability reflects the accumulated effect of the profit reductions in the early years of leases and equates to a reduction in equity. However, the reduction in

profit also implies a reduced tax charge[1]. ILW capture the tax consequences of capitalisation in their sixth assumption: that the combined effective tax rate is 40% which approximates to McDonalds' actual effective tax rate in 1988 of 38.3%. The excess of the unrecorded lease liability over the unrecorded lease asset is taxed at this rate to reflect the effect on (deferred) tax.

3. Methods

3.1. Sample selection

A large, randomly selected sample of 300 listed industrial and commercial companies was selected for analysis. Financial companies were excluded as our analysis of the Extel Company Analysis database showed this sector to employ minimal leasing. In addition, many financial companies are likely to be substantial lessors; the impact of re-

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[1] The tax payment will not be affected as the tax rules currently allow full deductibility of operating lease rentals, but the charge will be adjusted by a transfer from deferred tax in accordance with the accruals/matching principle.

Figure 3
Effect of capitalisation on profit
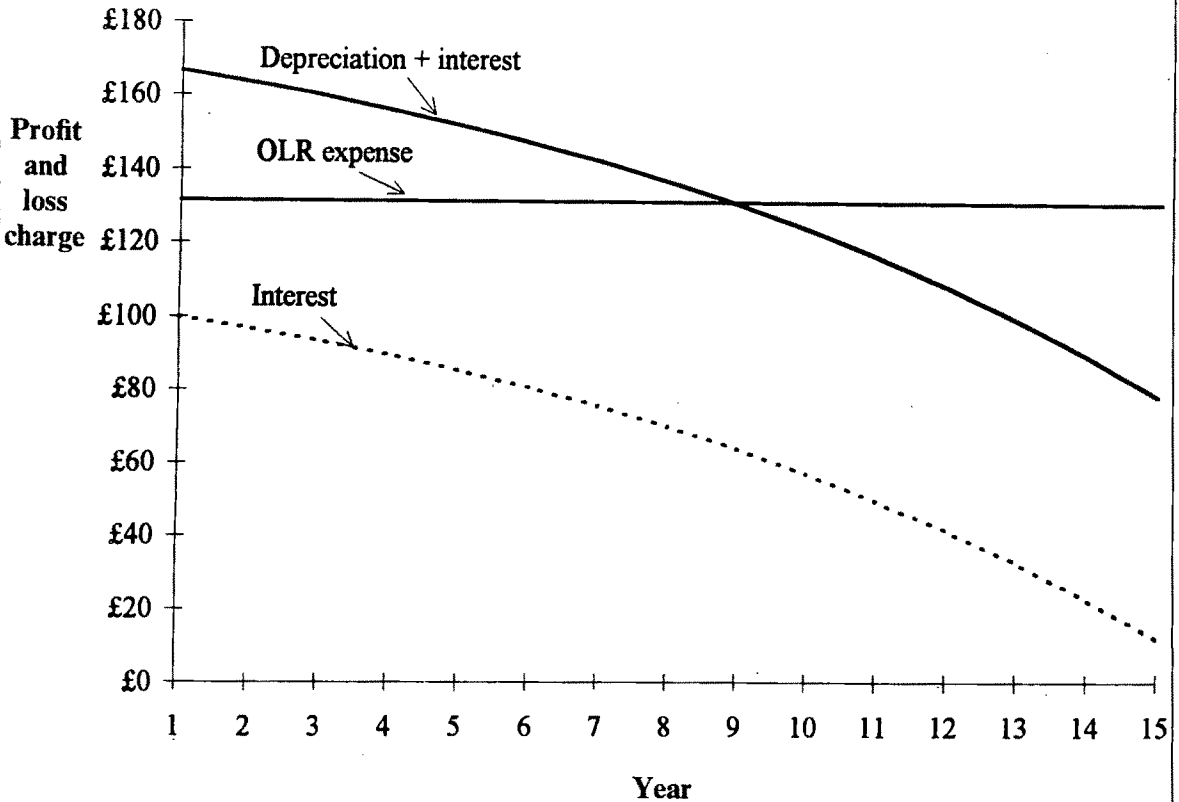
Source: Based on Figure 2 in Imhoff, Lipe and Wright (1991: 59)

Illustration is based on an asset value of £1,000 leased over 15 years with an implicit interest of 10% per annum. This gives an annual operating lease rental expense (OLR) of £131.47. If the asset is capitalised, the straight-line depreciation charge will be £66.67 per annum. In year 1, the interest element of the OLR will be £100. Thus, if capitalised, the operating profit (EBIT) will increase by £64.80 (+£131.47-£66.67) but profit before tax will fall by £35.20 (+£131.47-£66.67-£100). If the effective tax rate was 30%, say, then the tax charge will be £10.56 lower (30% of 35.20) and the profit after tax will reduce by £24.64 (-£35.20+£10.56).

It is assumed that (i) the primary lease period is less than or equal to the useful life of the asset, and (ii) straight-line depreciation is based on the shorter of the primary lease period and the useful life (consistent with the SSAP 21 required treatment for finance leased assets).

porting changes on lessors is outside the scope of the present study. The UKQI list current in 1995 (the year in which the sampling was undertaken) was used as the initial sampling frame. This *Datastream* listing of approximately 1,300 companies contains all the UK industrial and commercial companies for which *Datastream* has accounting information. A particular methodological problem in studies concerning performance is 'survivorship bias', which refers to the use of samples which are biased towards long-surviving companies (see, for example, Brown et al., [1992], for a review of this problem).

To overcome this problem, the 1995 UKQI list was augmented by a group of approximately 250 'dead' companies (failed, taken over, or gone private), identified from a comparison of the *Times 1,000* 1981/82 top UK companies (no historic UKQI list being available) with the 1995 UKQI list. The year 1981 was selected for comparison purposes because it is the year in which ED 29 was published, and some of our analysis therefore covers the 14 year period 1981 to 1994. The final sample of 300 companies comprised 53 'dead' companies, 122 'new' companies, and 125 companies which had existed from 1981 to 1994.

3.2. Data collection and sample representativeness checks

Information to enable key pre-operating lease capitalisation ratios and the effective tax rate of each company to be calculated was extracted from *Datastream*. Eleven profit and loss and balance sheet items and industry group membership were collected (see Table 2, panel A). Leasing data to support the operating lease capitalisation procedure is contained in the notes to the accounts (not available in *Datastream*); this was extracted manually from company microfiches. The detailed information collected is shown in Table 2, panel B.

At this point, sample representativeness checks were performed, based on total assets (item 392) and share capital and reserves (item 307). This showed that the company size distribution and industry sector distribution of the sample approximated closely to that of the population, indicating that the sample adequately represented the population.[2]

3.3. Modification of ILW capitalisation procedure

The ILW procedure was adapted to take into account the different operating lease disclosure requirements in the UK. In addition, to assess the

[2] The mean total assets for the sample is 115% of the population mean total assets, while the mean share capital and reserves for the sample is 127% of the population share capital and reserves. The size distribution of the sample companies was also positively skewed (coefficient. = 8.3), consistent with observed population skewness.

appropriateness of ILW's assumptions for the UK environment, we first undertook a preliminary analysis regarding operating lease lives. This failed to produce reasonable and consistent results, due to the considerable variation in leasing patterns within our sample companies. The pattern of operating lease commitments over the period 1985 through 1994 was analysed for a small sub-sample of companies. This identified some companies with commitments predominantly in the '> five years' category, some predominantly spread over the two '≤ five years' categories, and some spread over all three expiry categories. Thus, some companies take on only short- to medium-term leases, some mainly long-term leases, and some the whole range of lease durations.

ILW's assumption of uniform total and remaining lease lives is unable to capture such diversity. In particular, calculation of the impact of capitalisation on the profit and loss account (not investigated by ILW) would be severely distorted. For example, imagine a company which takes on only medium-term leases of, say, five years. In a steady-state, the average remaining life for the company's leases would be approximately three years. ILW suggested a uniform assumption of 15-year remaining lease life. If this were applied to such a company, the depreciation charge in the P&L account upon capitalisation of the operating leases would be one-fifteenth of the asset value (assuming straight-line method) rather than one-third and would give a large understatement of the effect on operating and pre-tax profit.

Table 2
Data collected for each year from 1981 to 1994 inclusive for 300 sample companies

Panel A: Datastream

Item description	Datastream code
Sales	104
Total interest charges	153
Pre-tax profit — adjusted	157
Total tax charge — adjusted	172
Total share capital and reserves	307
Borrowings due within one year	309
Total loan capital	321
Total capital employed	322
Total cash and cash equivalents	375
Total current liabilities	389
Total assets	392
Industry group	Level 3

Panel B: Company microfiche
Profit and loss account charge for operating lease rental, split into plant and equipment, land & buildings, and other, where given.
Note to the accounts giving operating lease commitments due within the next year, split into asset category and lease expiry category.

We therefore developed ILW's method to incorporate company-specific assumptions in respect of the remaining lease life, the asset proportion, and the effective tax rate. We also distinguish in our analysis between asset categories and lease expiry categories, performing separate calculations of remaining lease life and asset proportion for each. Our capitalisation procedure is now described in detail.

The operating lease information disclosed by UK companies in a note to the financial statements is a schedule of *next year's* operating lease payments (compared to the minimum *total* future payments disclosed by US companies). This figure is analysed by asset category (i.e., 'land and buildings' and 'other') and by lease expiry date (i.e.,

leases expiring within one year, between one and five years, and after five years). Although generally less complete than US disclosures, UK disclosures do have the advantage of giving a more reliable picture of the company's pattern of remaining lease lives. Figure 4 provides an illustration of UK disclosure in respect of the 'land and buildings' category (Panel B) and of US disclosure (Panel A), reported voluntarily in this case by the company.

We first used 13 cases of such combined US and UK disclosure by UK companies to develop base estimates of remaining and total lease lives appropriate to the UK setting. These cases were contained in the accounts of seven companies between 1987 and 1995, and were taken from 20F forms and from voluntary disclosures identified during

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Figure 4
Illustration of calculation of remaining lease life estimate for company disclosing both minimum total future operating lease payments and next year's commitment

Company Name: NFC plc
Asset category: Land and buildings
Year-end: 30 September 1995
All monetary values in £m

Panel A	Amounts payable in years	Minimum total future operating lease payment (TCF)
	<1	61.2
	1-5	162.6
	>5	290.0
	Total commitment	513.8

Panel B	Leases expiring in years	Next year's operating lease commitment (CF1)
	<1	17.9
	1-5	24.7
	>5	18.6
	Total	61.2

Since the total lease liability beyond year five ($TCF_{>5} = £290m$) can only relate to leases expiring beyond year five, and assuming that next year's commitment for leases expiring after five years ($CF1_3 = £18.6m$) is constant over the remaining life of the leases, then the £290m represents 15.6 years payments after year five, giving a total remaining life of 20.6 years (on average), i.e.,

$$RL_3 = \frac{TCF_{>5}}{CF1_3} + 5 = \frac{290.0}{18.6} + 5 = 20.6 \text{ years}$$

The total liability between years one and five ($TCF_{1<t\leq5} = £162.6m$) relates to leases expiring beyond year five, as well as those expiring within the one to five year period. Assuming four years of the constant annual payment of £18.6m relating to the former leaves £88.2m relating to the latter. This equates to 3.6 years of constant £24.7m ($CF1_2$) after the first year giving an average remaining life of 4.6 years for this category, i.e.,

$$RL_2 = \frac{TCF_{1<t\leq5} - (4 \times CF1_3)}{CF1_2} + 1 = \frac{162.6 - (4 \times 18.6)}{24.7} + 1 = 4.6 \text{ years}$$

The remaining life for the '<1 year' expiry category is assumed to be one year exactly, consistent with the general assumption of year end cash flows, i.e.:

$$RL_1 = 1$$

data collection.[3] Figure 4 also provides an illustration of the base estimate calculations for one of the thirteen cases.

For each asset category, the total next year's operating lease payments can be expressed as:

$$\sum_{e=1}^{3} CF1_e \qquad (2)$$

where e = lease expiry category (e = 1 (within one year), 2 (between one and five years), and 3 (after five years)). This describes the total of £61.2m in panel B of Figure 4.

The additional US-style disclosures permitted the remaining lease life of each lease expiry category to be estimated as follows:

$$RL_3 = \frac{TCF_{>5}}{CF1_3} + 5 \qquad (3)$$

where RL_e = the remaining lease life of assets in lease expiry category e,

TCF_t = minimum total future operating lease cash flows payable in period t, and

$CF1_e$ = next year's operating lease cash flows for assets in lease expiry category e.

The first term in equation 3 represents an estimate of the number of years' payments included in TCF, assuming that the next year's payment (CF1) is, on average, constant throughout the life of the lease. In the example in Figure 4, RL_3 is calculated to be 20.6 years. Similarly,

$$RL_2 = \frac{TCF_{1<t\le 5} - (4 \times CF1_3)}{CF1_2} + 1 \qquad (4)$$

In the example in Figure 4, RL_2 is calculated to be 4.6 years. Note that RL_1 is taken to be one year, assuming year-end cash flows.

Remaining life estimates for each of the thirteen identified cases were averaged to give base estimates (RL_{base}) for application to the whole sample. These cases were also used to subjectively estimate suitable corresponding base total lease lives (TL_{base}), based on the remaining lease life and the observation that the lease portfolio of our companies was generally quite young. These estimated lease lives are shown in Table 3.[4,5] As discussed

above, for the purpose of assessing the 'asset proportion', these estimates were rejected as valid common assumptions for all companies, and were refined by weighting each base lease life by the individual company's cumulative historic (from 1981 to 1994, inclusive) volume of leases in the lease expiry category. This refinement seeks to estimate an overall weighted average life which reflects each particular company's lease profile; while not rigorously determined, this adjusts in an appropriate direction. Use of the cumulative historic volume of leases in each lease expiry category might be expected to give a more reliable indication of the average proportion of lease life expired than the use of data from a single year.[6]

The weight for lease expiry category e (w_e) is given by:

$$w_e = \sum_{e=1}^{3} \left(\frac{\sum_{t=1981}^{1994} CF1_{t,e}}{\sum_{e=1}^{3} \sum_{t=1981}^{1994} CF1_{t,e}} \right) RL_{base, e}$$

and the weighted average remaining life for company i (RL_i) is:

$$RL_i = \sum_{e=1}^{3} w_e RL_{base,e} \qquad (5)$$

Similarly, the weighted average total life for company i (TL_i) is:

$$TL_i = \sum_{e=1}^{3} w_e TL_{base,e} \qquad (6)$$

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[3] The 'Form 20-F' report to the SEC is required by companies that sponsor an ADR (American Depository Receipt) which is traded on one of the national stock exchanges such as the NYSE, the AMEX or NASDAQ. It contains additional disclosures not required by UK regulations. Other companies voluntarily disclosed minimum *total* future operating lease payments.

[4] Further support for the use of a 25-year total lease life for land and buildings was provided by the disclosure of lease contract details relating to 29 separate properties valued over £1m in the 1996 Report of Legal & General Investment Management Property Fund Portfolio. The median total lease life was 25 years, accounting for 62% of the individual leases.

[5] These base estimates for the '<1 year' and '1 to 5 years' categories (assumed to be 1 and 5, respectively) ignore

the liability which relates to longer expiry categories. To illustrate, consider the next year's commitment for leases expiring in less than 1 year. This could relate entirely to the final year's payment due on a 25 year lease, or entirely to 1 year leases, with the most likely scenario somewhere between these extremes. The weighting of base estimates reflects this variation. For example, if the first extreme scenario were true, then the '> 5 years' category would almost certainly represent the major category historically, and so the weighted average remaining life would be weighted appropriately towards 25 years.

[6] An alternative approach, suggested by one of the referees, is to use the particular year's reported operating lease commitment to estimate the weighted average total life of leased assets. This has the advantage of reflecting any changes in lease profile and is also consistent with the calculation of PV_L. However, it does not allow the historical pattern of one-year commitments to be reflected in the ratio of asset to liability. This alternative approach was tested on the full sample of companies for 1994. For individual companies there were changes to the asset proportion and to depreciation, and therefore also to the effect on annual profit and loss and related ratios. The overall impact on mean ratios (as reported in Table 7) was very small. One ratio (return on equity) showed increased variability and, as a result, the slightly higher post-capitalisation ratio of 8.37% was statistically insignificant (it is reported as significant at the 5% level in Table 7). Similarly, the maximum impact on rank correlations (as reported in Table 9) of 0.001 was minimal. In view of these findings, only the results based on the historical weighted average total life are reported.

Table 3
Base estimates of remaining and total lease lives calculated from Form 20F and voluntary disclosures

Lease expiry category (years)	Remaining lease life (RL_{base})		Total lease life (TL_{base})	
	Land & buildings	Other	Land & buildings	Other
Less than one	1	1	1	1
One to five	3	3	5	5
More than five	16	7	25	10

In contrast to ILW's procedure, which assumes that the weighted average remaining and total lease lives are constant across companies, our procedure establishes company-specific estimates which are assumed merely to remain stable for a given company over time.[7]

We selected a short-term borrowing rate, the three-month London deposit rate, as a suitable discount rate to use to discount the estimated future lease payments. This rate is similar to the Finance House Base Rate, used by members of the Finance and Leasing Association. The mean monthly rate (extracted from *Datastream*) for 1981 to 1994 was 10.8% and for the most recent business cycle (1988 to 1994) was 10.3%. We selected 10.3% as the most suitable discount rate, since the study covers 1990 to 1994, rounded to 10%.

Although the capitalisation of operating leases would not affect the amount of tax payable under current tax law, the amounts of tax charged to the current period and deferred to future periods are affected. An effective tax rate has to be calculated to incorporate this effect. Since this rate can vary considerably over time, the average effective tax rate for *each* company was calculated over the period 1981 to 1994.[8]

These company-specific remaining and total lease life estimates, and effective tax rate estimates, were then used to perform the constructive capitalisation of operating leases using the procedures of ILW (1991). The present value of the unrecorded liability (PV_L) for company i is calculated as:

$$PV_L = \sum_{e=1}^{3} (CF1_{i,e} \times PVAF_{r=10\%,RLbase,i,e}) \quad (7)$$

The corresponding present value of the unrecorded asset for company i is:

$$PV_A = PV_L \times \frac{RL_i \times PVAF_{r=10\%,TLi}}{TL_i \times PVAF_{r=10\%,RLi}} \quad (8)$$

where $PVAF_{r,n}$ represents the present value of an annuity of £1 for n periods at interest rate r%. PV_L and PV_A are calculated separately for both asset categories (i.e. for 'land and buildings' and 'other') and summed to give total unrecorded liabilities and assets. An illustration of this calculation for one company is given in Table 4.[9]

3.4. Impact of capitalisation on key accounting ratios

To facilitate comparison with previous studies, nine performance and gearing ratios were investigated, comprising the six ratios used by Ashton (1985), the two used by ILW (1991), and an additional gearing ratio (a variant used extensively in corporate annual reports).[10] Due to their assumption that operating lease capitalisation is income-neutral, ILW originally examined only return on assets and gearing ratios. Their subsequent paper (ILW, 1997) relaxes this assumption. The definitions of the nine ratios examined, and the corre-

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[7] Twenty-four companies did not disclose the split between asset categories, which affects the calculation of remaining and total lease lives for the 'more than five years' lease expiry category. To provide an estimate of the likely split for these companies, we calculated the mean split within each of the five industry groups using data from the remainder of the sample, cumulated over the period 1981 to 1994. The relevant mean industry split was then imputed in the place of the missing values.

[8] The data was winsorised; a technique to reduce the impact of serious outliers and non-normality, i.e., extreme observations (less than 0% or more than 50%) were reset to 0% and 50%, respectively (Foster, 1986: 103).

[9] Alternative approaches, involving three different assumptions, were also tried independently. First, operating lease rental was taken as the reported operating lease rental expense, rather than next year's operating lease commitment. Second, the operating lease liability for each asset category was estimated based on the overall average remaining life, rather than considering expiry categories individually. This allows the historic lease obligation profile to be reflected in both asset and liability estimates. Third, the PV_A/PV_L proportion was estimated for each expiry category, rather than using the overall average remaining and total lease lives. The results reported here are robust with respect to these alternatives.

[10] Many company managers seem to favour the *net* debt to equity ratio measure of gearing, claiming that the deduction of cash (and often also short-term investments) gives a fairer picture of the debt exposure facing the company. The definition adopted here included short-term borrowings within debt.

Table 4
Illustration of operating lease capitalisation calculations

Company name: Cluff Resources

Asset category: Land & buildings

All monetary values in £000s

Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Next year's operating lease commitment as reported in 1981-94					$7=2+3+4+5+6$	$8=7\div£2125$ from Table 3	9 from Table 3	$10=8\times9$	11 from Table 3	$12=8\times11$	13	$14=6\times13$
Leases expiring (e)	1981-90	1991	1992	1993	1994	ΣCFl_e	w_e	$RL_{base,e}$	RL_e	$TL_{base,e}$	TL_e	$PVAF_{10\%RL\ base}$	PV_{Le} in 1994
Within one year	0	190	190	0	11	391	0.184	1	0.184	1	0.184	0.9091	10.0
Between one and five years	0	713	523	190	190	1616	0.760	3	2.280	5	3.800	2.4869	472.5
After five years	0	0	0	0	118	118	0.056	16	0.896	25	1.400	7.8237	923.2
Total	0	903	713	190	319	2125	1.000		3.360		5.384		1405.7

$$\text{Asset proportion} = \frac{RL \times PVAF_{r\%,TL}}{TL \times PVAF_{r\%,RL}} = \frac{3.360 \times \overline{PVAF_{10\%,5.384}}}{5.384 \times PVAF_{10\%,3.360}}$$

$$= \frac{3.360 \times 4.104}{5.384 \times 2.740} = 0.9142$$

$$PV_A = PV_L \times \text{assest proportion}$$

$$= 1450.7 \times 0.9142$$

$$= \mathbf{1285.1}$$

sponding *Datastream* item codes, are given in Table 5, panel A, columns 2 and 3. The impact of operating lease capitalisation on the constituent accounting numbers is shown in Table 5, panel B.

To calculate post-capitalisation earnings before interest and tax (EBIT), the annual operating lease rental is added back and annual straight line depreciation of the capitalised asset is deducted from pre-capitalisation EBIT. To calculate post-capitalisation profit after interest and tax (PAIT), pre-capitalisation PAIT is adjusted by the net-of-tax effect of adding back annual operating lease rental and deducting both annual straight line depreciation of the capitalised asset and annual lease interest expense. The expected direction of change in each ratio following operating lease capitalisation is given in the final column of Table 5, panel A.

4. Results

4.1. Impact in 1994

This analysis is based on 232 of the 247 'new' and 'continuing' companies. Five companies were eliminated from the sample at the data collection stage, because their accounts had not been updated on *Datastream*. A further 10 companies were excluded due to outlying observations (negative equity or capital employed before or after capitalisation) which would have distorted the sample means severely. Table 6 provides a summary of the estimated mean capitalised value of operating lease assets and liabilities for 1994. Overall, the mean total *liability* in respect of operating leases was £51m, of which £8m would be classified on the balance sheet as short-term (i.e., due within one year) and £43m as long-term (i.e., due after more than one year).[11]

On average, the latter represented 39% of long-term debt before capitalisation. Wide variation was observed across the five sectors, ranging from a mean long-term liability of just £6m (3% of long-term debt) for mineral extraction, to £88m (69% of long-term debt) for the services sector. Capitalised operating lease *asset* values ranged from a mean of £5m for mineral extraction to £80m for services, with an overall mean of £40m, representing 0.8%, 13%, and 6% of pre-capitalis-

ation total assets, respectively.[12] Thus, operating leases represent a major source of long-term debt-type financing in the UK. Under current accounting regulations, approximately 39% of long-term liabilities do not appear on the balance sheet, with total assets being understated by approximately 6%.

The magnitude and statistical significance of the changes in the nine selected ratios following operating lease capitalisation is shown in Table 7. Statistical significance was examined using both the paired t-test and the Wilcoxon test, which test for differences between the pre- and post-capitalisation ratios, based on absolute values and rank difference values, respectively. Only t-test results are reported here; the corresponding non-parametric test (the Wilcoxon signed ranks test of change in medians) consistently produced results of *greater* significance.[13] Two-tailed tests were used throughout, despite the existence of uni-directional expectations (which were confirmed) for six of the ratios; thus the reported significance levels for these ratios are conservative. For the sample as a whole, a significant impact at the 1% level was observed for six of the ratios (profit margin, return on assets, asset turnover, and the three gearing measures), with a further one ratio significant at the 5% level (return on equity). Return on capital employed and interest cover were not significantly affected. Of the three gearing measures, the percentage change in the net debt to equity ratio (260%) is particularly striking. Since this gearing measure produces a lower figure pre-capitalisation than the ILW total debt to equity ratio, the capitalised lease liability has a greater proportionate impact.

The pattern of results across industry groups is also reported in Table 7, although these results must be compared with caution since the number of companies in each group varies considerably, with the mineral extraction and utilities groups being very small in size. The effect of operating lease capitalisation on profit margin, asset turnover, and the three gearing measures is significant at the 1% level for three industry groups—consumer goods, general industrial, and services. The only significant results for these five ratios in the remaining two industry groups are profit margin (significant

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[11] Of the sample, 16% had no operating leases; the equivalent figures based on only those companies with operating leases rise to, approximately, £61m (total), £10m (short-term), and £51m (long-term).

[12] The median capitalised value of operating lease liabilities was only £4.1m, compared to the mean of £51m. However, the relative magnitude of this figure must be assessed in the context of the positively skewed nature of the distributions of company size and capitalised operating lease assets and liabilities. The long-term element of the median total liability was £3.2m, which represents 140% of the median long-term debt before capitalisation. The median value of capitalised operating lease assets was £3.3m compared to the mean of £40m. This represents 5.4% of median total assets before capitalisation.

[13] The use of a non-parametric test takes into account the non-normal distribution of many ratios (Barnes, 1987).

Table 5
Definition of key ratios and the impact of operating lease capitalisation on constituent accounting numbers

Panel A: Definitions of key ratios

Ratio	Definition	Datastream definition	Expected impact of capitalisation
Profit margin	$\dfrac{\text{Earnings before interest \& tax (EBIT)}}{\text{Sales}}$	$\dfrac{157+153}{104}$	+
Return on equity	$\dfrac{\text{Profit after interest \& tax (PAIT)}}{\text{Equity } (E_{Ashton})}$	$\dfrac{157-172}{307}$	+ or −
Return on assets	$\dfrac{\text{Profit after interest \& tax}}{\text{Total assets (TA)}}$	$\dfrac{157-172}{392}$	−
Return on capital employed	$\dfrac{\text{Earnings before interest \& tax}}{\text{Capital employed (CE)}}$	$\dfrac{157+153}{322}$	+ or −
Asset turnover	$\dfrac{\text{Sales}}{\text{Capital employed}}$	$\dfrac{104}{322}$	−
Interest cover	$\dfrac{\text{Earnings before interest \& tax}}{\text{Interest (I)}}$	$\dfrac{157+153}{153}$	+ or −
Gearing$_{Ashton}$	$\dfrac{\text{Long-term debt (LTD)}}{\text{Capital employed}}$	$\dfrac{321}{322}$	+
Gearing$_{ILW}$	$\dfrac{\text{Total debt (D)}}{\text{Equity } (E_{ILW})}$	$\dfrac{321+389}{307}$	+
Gearing	$\dfrac{\text{Total borrowing less cash \& cash equivalents (TB)}}{\text{Equity } (E_{ILW})}$	$\dfrac{321+309-375}{307}$	+

Panel B: Impact of operating lease capitalisation on constituent accounting numbers

$$EBIT_{post} = EBIT_{pre} + OLR - depn$$
$$PAIT_{post} = PAIT_{pre} + (1-T)(OLR - depn - int)$$
$$E_{Ashton,\,post} = E_{Ashton,\,pre} - (PV_L - PV_A)$$
$$TA_{post} = TA_{pre} + PV_A$$
$$CE_{post} = CE_{pre} + PV_A - [OLR/(1+i)]$$
$$I_{post} = I_{pre} + int$$
$$int = [i \times (PV_L + OLR)]/(1+i)$$
$$D_{ILW,\,post} = D_{ILW,\,pre} + PV_L - T(PV_L - PV_A)$$
$$E_{ILW,\,post} = E_{ILW,\,pre} - (1-T)(PV_L - PV_A)$$
$$LTD_{Ashton,\,post} = LTD_{Ashton,\,pre} + PV_L - [OLR/(1+i)]$$
$$TB_{post} = TB_{pre} + PV_L$$

where

OLR = annual operating lease rental (for consistency with asset and liability estimates, this was taken as next year's operating lease commitment, as specified in the notes to the accounts, rather than the current year reported operating lease rental);

depn = annual straight line depreciation of capitalised asset;

T = effective tax rate;

int = annual lease interest expense;

i = rate of interest implicit in lease; and

the subscripts 'pre' and 'post' signify values before and after operating lease capitalisation, respectively.

$T(PV_L - PV_A)$ = reduction in deferred tax due to operating lease capitalisation

$OLR/(1+i)$ = short-term portion of lease liability

Table 6
Estimated mean capitalised value of operating lease assets and liabilities for 1994

Variable	Variable name[1]	Industry mean (£m)					Sample mean (£m)
		Consumer goods (n=33)	General industrial (n=100)	Mineral extraction (n=7)	Services (n=81)	Utilities (n=11)	(n=232)
Lease liability : short-term[2] (due within 1 year)	$OLR/(1+i)$	7.3	3.9	1.0	15.5	4.5	8.3
: long-term[2] (due after more than 1 year)	$PV_L - OLR/(1+i)$	37.4	13.0	5.7	87.9	23.1	42.5
: total	PV_L	44.7	16.9	6.7	103.4	27.6	50.8
Long-term debt (before capitalisation)	LTD	69.3	95.8	217.9	127.5	129.6	108.1
Lease liability: long-term/long-term debt (before capitalisation) [%]		54.0%	13.6%	2.6%	68.9%	17.8%	39.3%
Lease asset	PV_A	35.2	14.2	5.2	79.8	21.6	39.9
Total assets (before capitalisation)	TA	575.1	628.7	644.4	628.4	823.3	629.8
Lease asset/total assets (before capitalisation) [%]		6.1%	2.3%	0.8%	12.7%	2.6%	6.3%

Notes: 1. See Table 5 Panel A for definitions of variables
2. Classification based on balance sheet categories (i.e., current liabilities = due within one year; long-term liabilities = due after more than one year).

Table 7
Magnitude and statistical significance of changes in mean ratios following operating lease capitalisation for 1994

	Consumer goods (n=33)			General industrial (n=100)			Mineral extraction (n=7)			Services (n=81)			Utilities (n=11)			Total (n=232)			
Ratio[1]	post	pre	Diff.[2] Sig[3]	Post	Pre	Diff. sig.	Post	Pre	Diff. sig.	Post	Pre	Diff. sig.	Post	Pre	Diff. sig.	Post	Pre	Diff. sig.	%Δ
Profit margin(%)	10.73	10.00	0.73[a]	7.72	7.11	0.61[a]	10.81	10.60	0.21	10.05	8.12	1.93[a]	23.60	23.29	0.31[c]	9.81	8.75	1.06[a]	12.1
Return on equity(%)	1.43	1.66[c]	−0.23	9.40	9.12	0.28	−2.33	−1.85	−0.48	9.53	8.69	0.84[b]	17.07	16.83	0.24	8.32	7.94	0.38[b]	4.8
Return on assets (%)	3.60	3.96	−0.36[c]	4.12	4.34	−0.22[a]	0.44	0.49	−0.05	3.54	4.47	−0.93[a]	8.81	9.11	−0.30	3.96	4.44	−0.48[a]	−10.8
Return on capital employed (%)	11.06	10.52	0.54	14.71	14.83	−0.12	4.31	4.32	−0.01	15.87	16.19	−0.32	20.08	20.31	−0.23	14.54	14.63	−0.09	−0.6
Asset turnover	2.74	3.05	−0.31[a]	2.43	2.63	−0.20[a]	0.28	0.28	0.00	2.54	3.14	−0.60[a]	1.00	1.06	−0.06	2.38	2.72	−0.34[a]	−12.5
Interest cover[4]	6.65	12.51	−5.86[b]	7.77	14.61	−6.84[a]	13.92	13.93	−0.01	17.93	17.29	0.64	17.08	28.50	−11.42	11.78	15.90	−4.12	−25.9
Gearing (Ashton)	0.23	0.13	0.10[a]	0.20	0.12	0.08[a]	0.26	0.25	0.01	0.39	0.17	0.22[a]	0.21	0.18	0.03	0.27	0.14	0.13[a]	92.8
Gearing (ILW)	1.48	1.23	0.25[a]	1.29	1.10	0.19[a]	1.12	1.07	0.05	2.67	1.35	1.32[a]	0.83	0.73	0.10	1.77	1.19	0.58[a]	48.7
Gearing (net debt to equity)	0.45	0.22	0.23[a]	0.32	0.14	0.18[a]	0.71	0.66	0.05	1.41	0.24	1.17[a]	0.19	0.10	0.09	0.72	0.20	0.52[a]	260.0

Notes: [1]See Table 5 for definitions.

[2]Difference = Post - Pre.

[3]Significance of two-tailed paired t-test ([a]=significant at 1% level; [b]=significant at 5% level; [c]=significant at 10% level). Only t-test results are reported here, the corresponding non-parametric test (the Wilcoxon signed ranks test of change in medians) consistently produced results of *greater* significance.

[4]Excludes nine companies which had no interest expense pre-capitalisation.

Table 8
Comparison with results of previous studies

	Study		
Nature of sample	*Ashton (1985)* n=23; non-random; 1983/84 accounts	*ILW (1991)* n=14; non-random; 1988 accounts	*Present study[1]* n=232; random; 1994 accounts
Country	UK	US	UK
Type of lease capitalised	Finance	Operating	Operating
Ratio	*Percentage change in ratio following capitalisation and statistical significance[2]*		
Profit margin	1.02[NS]	NA	12.1***
Return on equity	2.85[NS]	NA	4.8**
Return on assets	NA	−22.00[4]	−10.8***
Return on capital employed	0.24[NS]	NA	−0.6
Asset turnover	−0.77[NS]	NA	−12.5***
Interest cover	2.74[NS]	NA	−25.9
Gearing$_{Ashton}$	20.11[S,3]	NA	92.8***
Gearing$_{ILW}$	NA	119.00[4]	48.7***
Gearing$_{net debt to equity}$	NA	NA	260.0***

Notes: 1. From Table 7, final column.
2. NA = ratio not included in study; NS = not significant; S = significant; significance of two-tailed paired t-test (*** = significant at 1% level; ** = significant at 5% level; * = significant at 10% level).
3. Ashton (1985: 236) reports a 'decline' in the gearing ratio of (20.11); in fact the direction of change must be positive.
4. Derived from figures reported in ILW (1991: 61); no statistical tests of significance were performed.

at 10% for utilities) and Ashton's gearing measure (significant at 10% for mineral extraction). Return on assets is significant at the 1% level for general industrial and services and at the 10% level for consumer goods. Return on equity is significant for only the services sector (at the 5% level), a result which drives the 5% significance for the sample as a whole. Interest cover, while insignificant across the whole sample, is significant for the consumer goods and general industrial sectors (at the 5% and 10% levels, respectively). Finally, return on capital employed is not significant for any sector (or for the whole sample).

It is noticeable that, based on constructive results, operating lease capitalisation impacts on the services sector most acutely. The effect on all three gearing measures was markedly in excess of that in any other sector, as was the effect on profit margin, return on assets, and asset turnover. This can be explained by the greater reliance on operating leases by this sector. In 1994, the total next year's operating lease commitments of the sample companies alive in that year was £2,208m. Service sector companies, which account for 37% of this set by number, account for 69% of the total commitment. This equates to a mean value of £16.9m per services company, the corresponding means for the other four sectors being, in descending order,

£15.4m (utilities), £5.8m (consumer goods), £3.1m (general industrial) and £1.1m (mineral extraction).

Our findings with respect to the total sample contrast sharply with those of Ashton (1985), who found only the gearing ratio (out of the six ratios which he examined) to be affected significantly. (Unfortunately, Ashton does not state whether one- or two-tailed tests were used or the cut-off level of significance adopted.) It is likely that the low percentage change in ratios found by Ashton (and their lack of significance) is attributable partly to his exclusive focus on finance leases and his small sample size. Further, his sample consisted entirely of companies which adopted the lease accounting standard at the exposure draft (ED29) stage. It is likely that the expected impact of the change in regulation on early adopters was small. Our findings are, however, less strong than those of ILW, who do consider operating leases. ILW's results imply a 22% decline in return on assets for their sample of 14 companies and a 119% increase in gearing (statistical significance is not considered). The comparable figures in the present study are −11% and +49%, respectively. This is surprising, given the greater stringency of US lease accounting regulation which leads us to expect, *ceteris paribus*, operating lease capitalisation to

Table 9
Rank correlation of pre- and post-operating lease capitalisation ratios for 1994

| | Industry | | | | | |
	Consumer goods (n=33)	General industrial (n=100)	Mineral extraction (n=7)	Services (n=81)	Utilities (n=11)	Total (n=232)
Ratio[1]						
Profit margin	0.988	0.985	1.000	0.903	1.000	0.953
Return on equity	0.997	0.998	0.964	0.988	1.000	0.996
Return on assets	0.956	0.992	1.000	0.933	0.936	0.966
Return on capital employed	0.999	0.997	1.000	0.982	1.000	0.992
Asset turnover	0.987	0.978	1.000	0.890	1.000	0.934
Interest cover[2]	0.809	0.945	1.000	0.732	0.782	0.826
Gearing$_{Ashton}$	0.701	0.771	1.000	0.418	0.636	0.638
Gearing$_{ILW}$	0.950	0.925	0.964	0.710	0.963	0.857
Gearing$_{net\ debt\ to\ equity}$	0.837	0.927	1.000	0.534	0.864	0.738

Notes: 1. See Table 5 for definitions.
2. Excludes nine companies with no interest expense pre-capitalisation.

Table 10
Magnitude and statistical significance of changes in mean ratios following operating lease capitalisation for 1990 to 1994

| | Mean difference between pre- and post-capitalisation ratios (significance)[2] | | | | | |
	1990	1991	1992	1993	1994 (from Table 7)	Range over period[3]
Ratio[1]						
Profit margin	0.93[a]	1.10[a]	1.23[a]	1.24[a]	1.06[a]	0.93$_{90}$ to 1.24$_{93}$
Return on equity	−2.08	−11.97	−1.22[c]	−4.46	0.38[b]	−11.97$_{91}$ to 0.38$_{94}$
Return on assets	−0.51[a]	−0.26	−0.38[a]	−0.45[a]	−0.48[a]	−0.51$_{90}$ to −0.26$_{91}$
Return on capital employed	−0.76[b]	0.69	0.40	0.23	−0.09	−0.76$_{90}$ to 0.69$_{91}$
Asset turnover	−0.35[a]	−0.37[a]	−0.39[a]	−0.34[a]	−0.34[a]	−0.39$_{92}$ to −0.34$_{93,94}$
Interest cover	−17.53[b]	−19.88[b]	−23.10[b]	−18.96[a]	−4.12	−23.10$_{92}$ to −4.12$_{94}$
Gearing$_{Ashton}$	0.12[a]	0.13[a]	0.14[a]	0.13[a]	0.13[a]	0.12$_{90}$ to 0.14$_{92}$
Gearing$_{ILW}$	1.06[c]	1.18[a]	0.88[a]	0.70[a]	0.58[a]	0.59$_{94}$ to 1.18$_{91}$
Gearing$_{net\ debt\ to\ equity}$	0.94[c]	0.90[a]	0.79[a]	0.61[a]	0.52[a]	0.52$_{94}$ to 0.94$_{90}$

Notes: 1. See Table 5 for definitions.
2. Significance of two-tailed paired t-test ([a] = significant at 1% level; [b] = significant at 5% level; [c] = significant at 10% level).
3. Subscripts indicate year(s) in which observation occurred.

have a greater impact upon accounting ratios in the UK.

However, ILW's sampling procedures differed from those adopted here in two key respects. ILW's sample comprises an equal number of 'high' lessees and 'low' lessees. Six of the matched pairs were retailers while the seventh was from the transport sector. Thus, all selected companies fall within the services sector (as defined in the present study). Moreover, their sample includes only com-

panies which had operating leases (16% of the sample in the present study had no operating leases). Each of these differences can be expected to result in larger changes than under random sampling. Table 8 provides a summary of the points of comparison between the Ashton (1985), ILW (1991), and the present study.

Arguably, in some decision contexts, the impact of operating leases capitalisation on the *absolute* magnitude of ratios is of limited relevance; what

Table 11
Rank correlation of pre- and post-operating lease capitalisation ratios for 1990 to 1994

Ratio[1]	1990	1991	1992	1993	1994 (from Table 9)	Range over period[2]
Profit margin	0.974	0.966	0.963	0.954	0.953	0.953_{94} to 0.974_{90}
Return on equity	0.996	0.992	0.992	0.992	0.996	$0.992_{91;92;93}$ to $0.996_{90;94}$
Return on assets	0.972	0.975	0.977	0.969	0.966	0.966_{94} to 0.977_{92}
Return on capital employed	0.987	0.988	0.992	0.992	0.992	0.987_{90} to $0.992_{92;93;94}$
Asset turnover	0.947	0.932	0.923	0.924	0.934	0.923_{92} to 0.947_{90}
Interest cover	0.901	0.925	0.918	0.880	0.826	0.826_{94} to 0.925_{91}
Gearing$_{Ashton}$	0.708	0.713	0.625	0.603	0.638	0.603_{93} to 0.713_{91}
Gearing$_{ILW}$	0.892	0.880	0.839	0.810	0.857	0.810_{93} to 0.892_{90}
Gearing$_{net\ debt\ to\ equity}$	0.806	0.788	0.752	0.682	0.738	0.682_{93} to 0.806_{90}

Notes: 1. See Table 5 for definitions.
2. Subscripts indicate year(s) in which observation occurred

really matters is whether the position of companies *relative* to each other (i.e., company rankings) is affected (Foster, 1986: 150–151).[14] The Spearman rank correlation coefficients between the pre- and post-capitalisation ratios are reported in Table 9. Across the sample as a whole, the four lowest correlations relate to gearing (interest cover plus the three debt/equity measures), the lowest being 0.638 for Ashton's (1985) definition of gearing.[15] Thus, gearing ratio correlations can be described as only 'moderate'.[16]

Turning to industry groups, the rank correlations for the services sector were, not surprisingly, the lowest among the five sectors, for all nine ratios, the margin of difference being greatest for the three gearing measures. This finding can be explained by both the overall magnitude of leasing undertaken by companies in this sector and the great variation in leasing levels (the sector includes retailers, hotels, media agencies, and vehicle distributors).

4.2. Inter-temporal stability

To assess the stability of our findings over time, we repeated the above analysis for the four years 1990 to 1993, inclusive. This period was selected because, in combination with 1994, it encompasses the latest recession and subsequent recovery. The

results for the combined industry groups for the period 1990 to 1994 are shown in Tables 10 and 11. The impact of operating lease capitalisation on the magnitude of the nine ratios, and consequent company rankings, is generally very stable over time. Close inspection does, however, reveal that the largest mean differences, and the lowest rank correlations, between pre- and post-capitalisation ratios occurred in the early part of the period. The largest difference was in 1990 for three ratios and in 1991 for a further two ratios, while the lowest correlations were in 1990 for five ratios and in 1991 for a further two ratios. It would appear that operating lease capitalisation had the greatest impact during the trough of the recession, when corporate performance was generally poor and gearing (including operating leasing) was high.

4.3. Sensitivity analysis

The sensitivity of the results to key assumptions made (especially the interest rate and estimated lease lives), was investigated using the data for 1994. First, the base assumption of a 10% interest rate was varied by ±2%. The impact upon the magnitude of the nine ratios, and consequent company rankings, is summarised in Table 12, columns 2–5. There is clearly very little change in the results. Significance levels remain unaffected (with the exception of return on capital employed, which becomes significant at the 5% level at the 8% interest rate) and the maximum absolute change in rank correlation coefficients is only 0.019 (the correlation coefficient for Ashton's measure of gearing falls from 0.638 (at 10% interest rate) to 0.619 (at the 8% interest rate)).

Second, we replaced the base estimates for remaining and total lease lives with two sets of more extreme estimates. One set generally places the leases at a much earlier stage of a shorter total life,

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[14] For example, in a loan appraisal, key ratios may be judged against benchmark measures, thus the absolute value of the ratio is relevant, whereas for investors and investment analysts, relative performance measures are of primary relevance.

[15] Ashton himself reported a rank correlation of 0.90 for this ratio (1985: 237). Possible reasons for the greater impact observed in the present study, discussed in the present paper, relate to the sample and lease type studied.

[16] Pearson product-moment correlation coefficients (not reported here) were substantially *lower* than the rank correlations for the four gearing-related measures and generally marginally *higher* for the other ratios.

Table 12
Sensitivity analysis of key assumptions underlying operating lease capitalisation for 1994

Col. 1	2	3	4	5	6	7	8	9
	Difference between pre- and post-capitalisation ratios using interest rate = [2]				Difference between pre- and post-capitalisation ratios using estimates of remaining and total lease lives = [2]			
Ratio[1]	8%	10% (from Table 7)	12%	Maximum absolute change in rank correlation due to interest rate variation[3]	Earlier stage of shorter life[4]	Best base estimate (from Table 7)	later stage of longer life[5]	Maximum absolute change in rank correlation due to lease life variation[6]
Profit margin	0.94[a]	1.06[a]	1.15[a]	0.008	0.97[a]	1.06[a]	1.16[a]	0.007
Return on equity	0.37[b]	0.38[b]	0.36[b]	0.000	-0.30[a]	0.38[b]	2.82[a]	0.058
Return on assets	-0.51[a]	-0.48[a]	-0.46[a]	0.006	-0.62[a]	-0.48[a]	-0.14[a]	0.026
Return on capital employed	-0.57[b]	-0.09	0.33	0.008	-0.63[b]	-0.09	1.36[a]	0.011
Asset turnover	-0.38[a]	-0.34[a]	-0.31[a]	0.015	-0.40[a]	-0.34[a]	-0.17[a]	0.049
Interest cover	-3.85	-4.12	-4.32	0.012	-4.27	-4.12	-3.92	0.011
Gearing$_{Ashton}$	0.13[a]	0.13[a]	0.12[a]	0.019	0.12[a]	0.13[a]	0.13[a]	0.005
Gearing$_{ILW}$	0.64[a]	0.58[a]	0.53[a]	0.012	0.45[a]	0.58[a]	0.81[a]	0.018
Gearing$_{Net\ debt\ to\ equity}$	0.58[a]	0.52[a]	0.47[a]	0.016	0.42[a]	0.52[a]	0.20[a]	0.029

Notes:
1. See Table 5 for definitions.
2. Significance of two-tailed paired t-test ([a] = significant at 1% level; [b] = significant at 5% level; [c] = significant at 10% level).
3. Max ($|R_{10\%} - R_{8\%}|$, $|R_{10\%} - R_{12\%}|$), where $R_{r\%}$ is the Spearman rank correlation coefficient between the pre- and post-capitalisation ratios, using an interest rate of r% in the procedure.
4. The remaining lives for land & buildings were set at 1, 4, and 16 years for leases expiring in '<1 year', '1-5 years' and '>5 years', respectively; the remaining lives for other assets were set at 1, 4, and 7 years for leases expiring in '<1 year', '1-5 years' and '<5 years', respectively. The corresponding total lives were 1, 5, and 20 and 1, 5, and 8, respectively.
5. The remaining lives for land & buildings were set at 1, 2 and 16 for leases expiring in '<1 year', '1-5 years' and '>5 years', respectively; the remaining lives for other assets were set at 1, 2, and 7 years for leases expiring in '<1 year', '1-5 years' and '>5 years', respectively. The corresponding total lives were 1, 5, and 50 and 1, 5, and 15, respectively.
6. Max ($|R_{BE} - R_{ES}|$, $|R_{BE} - R_{LL}|$), where R is the Spearman rank correlation coefficient between the pre- and post-capitalisation ratios, and BE = best estimates, ES = early stage of shorter life, and LL = later stage of longer life.

while the other generally places the leases at a much later stage of a longer total life. The impact of these alternative scenarios is summarised in Table 12, columns 6–9. The mean change in return on assets, return on capital employed, return on equity, ILW's measure of gearing, and net debt to equity is marked, especially under the later stages of a longer lease life scenario. However, significance levels remain unaffected (with the exception of return on equity and return on capital employed, which both increase in significance under each of the alternative scenarios). Supplementary analysis indicated the presence of a few extreme observations which were unduly influencing the calculated mean change in selected ratios. Only one ratio showed a maximum absolute change in rank correlation coefficient in excess of 0.05, and this was return on equity, which fell from 0.996 for the best estimate to 0.938 under the second alternative scenario. This sensitivity analysis suggests that the general results of this study are robust with respect to the key assumptions incorporated in the operating lease capitalisation procedure.

5. Summary and conclusions

Under current international lease accounting regulation, leases classified as operating leases do not have to be shown in the balance sheet. Following FRS 5, this situation is likely to change in the UK. This study reports the first large-scale analysis of the impact which the constructive capitalisation of operating leases has on nine key financial ratios used by investment analysts and other users, and also used in financial contracts.

The method of constructive capitalisation developed by ILW (1991) is refined to reflect more accurately individual companies' leasing profiles. Company-specific estimates of remaining and total lease lives, and effective tax rate, are incorporated, and the method distinguishes between asset categories. Application of this method to a randomly selected sample of 232 UK listed companies for 1994 demonstrated that operating leases represent a major source of long-term financing.

On average, the unrecorded long-term liability represented 39% of reported long-term debt, while the unrecorded asset was 6% of total assets. Capitalisation was shown to have a significant impact (at the 1% level) on the profit margin, return on assets, asset turnover, and the three measures of gearing. The rank correlation between pre- and post-capitalisation ratios revealed that company rankings changed markedly for gearing measures. Inter-industry analysis showed that the magnitude of ratio changes and the associated correlation of company rankings produced by operating lease capitalisation was greatest in the services sector, which has the highest value of operating leasing

per company and represents diverse company activities.

The capitalisation procedure used is limited by the availability of public domain data and does involve elements of subjectivity. However, findings were shown to be relatively stable across the five-year period from 1990 to 1994, although the magnitude of the impact of capitalisation appeared to be linked to the stage in the economic cycle. Findings were also shown to be robust with respect to the key assumptions of the capitalisation method used.

The potential economic consequences of a change in lease accounting regulation are extensive. Prior empirical studies indicate that a wide variety of individual users' decisions, market valuations, company cash flows, and managers' behaviour may all be affected by such a change. This paper provides systematic evidence of the magnitude of the impact of operating lease capitalisation on key financial issues. This can be expected to assist policy-makers in assessing the likely economic consequences of a change in lease regulation.

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Private disclosure and financial reporting

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Abstract—This article describes how large UK companies communicate with their institutional shareholders, and investigates how this private disclosure process relates to financial reporting. The article draws from case studies based on interviews with senior executives in 33 UK companies. Four insights into corporate disclosure arise from this case data. Firstly, a private disclosure process to institutional shareholders is outlined. Secondly, the private disclosure activity is recognised as a significant part of a larger corporate decision concerning public versus private voluntary disclosure. Thirdly, a range of factors are identified as encouraging private disclosure. These include the perceived limitations of financial reports (annual reports and interims), both as a disclosure mechanism in their own right and by comparison with private disclosure channels. Finally, despite these limitations, financial reports are recognised as a central component of a larger corporate disclosure system. The article therefore provides a novel insight in the role of financial reports in the larger corporate disclosure process, and ends by exploring new directions for research in financial reporting, including how the wider corporate disclosure system can be reformed in a systematic manner.

1. Introduction

The major aim of this research was to use corporate interviews to study private corporate communication to their main institutional owners. This aim was also pursued in order to gain some insight into the role of financial reports in the wider communication processes. The post-war concentration of share ownership in the hands of UK financial institutions (FIs) has created a more concentrated form of institutional influence and control over UK companies (Holland, 1995). This had reached the point in 1996 where up to 75% of major UK companies shares were held by institutions, with UK institutions owning about 60% of shares in UK companies (Gaved, 1997). The latter include UK institutions such as Mercury Asset Management and Morgan Grenfell Asset Management which are controlled by overseas institutions. Half of the UK equities in the UK stock market were owned by 50 financial institutions, the top 20 owned about a third of the market, the top 10 about a quarter, with the largest, Mercury Asset

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Management, owning 4% in 1996 (Gaved, 1997). The top 50 FIs dominated the shareholder bases of the case companies and constituted the bulk of their core FIs.

The changes in financial markets have coincided with problems with mandatory disclosure mechanisms. Stopford (1997) argues that the fusion of the information age with traditional industries has been a primary driver of innovation. As intangibles such as knowledge and innovation have become an increasingly important part of corporate value, then this has exacerbated the problem of how to disclose their value in annual reports. This has increased the information asymmetry between users and suppliers of equity risk capital. Both innovation and the scale of shareholder concentration have focused company and FI minds on each other and increased the significance of their direct relationships and other forms of private communication.

This article investigates the wider corporate disclosure process in 30 large and three medium-sized UK companies. Each case company adopted its own variant of a high quality corporate communication process to the City, which included voluntary disclosure through private and public disclosure channels and the rapid release of price sensitive information (PSI) into the public domain. The private disclosure process concerning financial institutions is explored in Section 4 and includes aims, constraints, and choices. The choices involved decisions on the content of information disclosed, and the preferred channels or mechanisms for disclosure. In Section 5, the factors encouraging private disclosure are discussed. In spite of the financial report's limitations, the case data

indicated that the financial report played a central role in corporate communications and formed a key part of more effective disclosure system. Section 6 reveals that this arose because of five productive interactions between financial reporting and the private disclosure process. These included the strong influence the financial reporting cycle had on the private process. The financial report created a minimum disclosure benchmark for private disclosure. Private disclosures were expected to improve the institutions' capabilities to interpret new financial reports. The financial report was a means to 'look into' companies and understand their fundamental economic behaviour and finally, by extending voluntary disclosure in the financial report, companies legitimised private disclosure. Section 7 summarises the paper and briefly explores how a research agenda for financial reporting might develop within this larger corporate disclosure process.

2. Literature review

The significance of private disclosure channels to analysts and financial institutions has been identified by academics and recognised by UK policy makers. The Myners Report was commissioned by the UK government in 1995 (Feb 1995, Department of Trade and Industry [DTI]), and advocated that private company and institutional meetings be improved in the interest of national competitiveness. Other studies have revealed the importance of corporate sources of information for financial institutions. Early studies by Moizer and Arnold (1984), Arnold and Moizer (1984), in the UK, and Chugh and Meador (1984) in the US, identified corporate contacts as important sources of information for analysts and for fund managers. Day (1986), in her study of UK investment analysts, confirmed that company management was an important source of analyst information, with the annual report acting as a source of reference. Bence et al. (1995), looking at one company in the UK chemical and pharmaceutical industry, identified the four highest rated sources of information for a sample of 12 UK institutional investors as company visits, personal interviews, company annual reports and company presentations.

Hellman (1996) developed an in-depth case study of a large Swedish institutional investor and found that there was no direct link between the release of financial reports and investor action, as suggested in market-based accounting research. The factors that seemed to initiate institutional investor decisions were macro economic information, private information, and different investor conditions. There were also considerable time lags between information receipt and trading actions. Joseph et al. (1996), investigated management accountants' perceptions of the needs of investors

and boards. The participants in their study rated both earnings per share and the price earnings ratio as more important than cash flow for investors. In contrast, they perceived cash flow information as more important for the board when the board was reviewing performance and when deciding strategy.

These perceptual differences are important because management could adapt the (external) voluntary disclosure processes, both public and private, to reflect these perceptions. This research also emphasised the need for further research on corporate disclosure processes. Holland (1995) explored how large UK financial institutions played an active 'behind the scenes' corporate governance role in their investee companies. Holland and Doran (1998) revealed how fund managers used direct contact with companies to acquire information for fund management purposes. This contact focused on management quality, succession, coherence of strategy and many other qualitative sources of private information.

In recent years there has also been a growing recognition of the limitations of financial reports and of public disclosure mechanisms. As a result there have been many attempts to improve public mandatory and voluntary disclosure by changes in financial reporting. For example in 1988, the Institute of Chartered Accountants of Scotland (ICAS) analysed many of the problems of contemporary financial reporting in *Making Corporate Reports Valuable* (ICAS, 1988). More recently, the Jenkins Report (AICPA, 1994) in the US has embraced a similar adaptive, incrementalist approach to financial reporting and corporate disclosure. In 1995, the Royal Society of Arts (RSA) inquiry on *"Tomorrow's Company"* was critical of conventional financial reporting practice as being too narrow and not reflecting the needs of a wide range of corporate stakeholders. It recommended a partnership approach to disclosure with all stakeholders and encouraged a more open dialogue.

The institutional concentration factor has increased the significance of financial institutions in the wider economy on matters of corporate governance and national competitiveness. The changing nature of innovation and the perceived limitations of financial reporting have increased perception of an information gap between companies and suppliers of capital, and these have combined with institutional concentration to increase incentives for private disclosure. Various academic studies have confirmed the significance of private information for institutional investors and the need for studies of disclosure processes. This research focuses on these areas and seeks to investigate private and public disclosure by UK companies to institutions and how this relates to financial reporting.

3. Research methodology

The private nature of the company and institutional exchanges meant that conventional research methods such as disclosure indices or event studies were considered inappropriate. Relatively simple semi-structured questions were used to encourage managers to talk in detail about their private disclosure to financial institutions. The questions concerned the nature of their relationships with institutions, the information released to institutions, and the public and private roles of financial reports. Qualitative research methods such as those employed here allow rich insight into new research fields and provide the basis for the establishment of understandings of the interpersonal and social construction of everyday decisions and action (Morgan and Smircich 1980, Tomkins and Groves 1983, Scapens 1990, Easterby-Smith et al. 1991). An extended discussion of the use of the case interview method in a company and financial institution context can be found in Stoner and Holland (1996).

Thirty large, listed, UK companies were sampled, representing 20 FT sectors. Of these, 21 companies fell within the FTSE 1 to 100 size group and nine were in the FTSE 101 to FTSE 250 group. An additional three medium-sized companies were interviewed in the FTSE 251 to 550 groups (see Appendix 1). Confidential case studies were prepared from the interviews with the senior executives. The interviews were conducted over a nine-month period from September 1995 to May 1996.

The case data formed the basis for identifying common disclosure themes across the cases. The case data was used in the article in three ways. First, as the basis for developing a model of connected themes of corporate private disclosure to institutional shareholders. Second, to compare financial reporting and institutional-company (FI-Co) links as disclosure mechanisms. Third, to investigate how these disclosure mechanisms interacted to form a more comprehensive disclosure system. Short quotes from the cases were used to illustrate these disclosure themes. The quotes have been edited to preserve the confidentiality of the sources.

These themes in corporate disclosure behaviour, both private and public, were identified through a Glaser and Strauss (1967), 'Grounded theory', approach to the case data. A seven-stage approach was adopted to sifting through and processing the large volumes of case interview data (Easterby-Smith et al., 1991). These stages included case familiarisation, reflection on the contents, conceptualisation, cataloguing of concepts, recoding, linking, and re-evaluation. During these data analysis stages, the interview responses of the company executives were compared in order to identify

common themes and relationships which indicated inter-subjective understandings of 'Industry-City' communications and of interactions with financial reporting. Disclosure themes were identified from case interview data in a manner similar to Gibbins et al. (1990), where the researchers studied disclosure processes in 20 Canadian firms, and Holland and Stoner (1996) where they investigated how 27 large UK companies dealt with Stock Exchange induced price sensitive information (PSI) constraints operating on corporate disclosure processes. Thus the interview data was used to induce a vocabulary of disclosure constructs and variables to describe disclosure processes and to identify relations among these constructs and variables. The subsequent model of the private disclosure process linked these variables and constructs and was grounded in the experiences of the interviewees. The comparison between financial reporting and FI-Co links was also grounded in the experiences of the interviewees.

It is important to recognise that it is problematic to generalise beyond the case study companies. Despite the coverage of major UK companies the article does not claim to be a representative study of all large UK companies. However, the findings of this research may form a basis for further research of this phenomena. The case data was not as complete as the themes suggest. Each case included each major disclosure theme, but in different degrees of detail. Thus all case companies had a structured approach to communicating with FIs and used a combination of private and public disclosure mechanisms. Nevertheless the case data revealed some variety within this overall framework.

For example, the cost and benefit categories varied across cases (Section 4.2.), but each case adopted some form of cost-benefit calculation for corporate communications. There was also variation in the case company view of increasing financial report complexity and the problems of understanding this created for their core FIs. All case companies identified the issue of increasing complexity but varied in their view of how this affected FIs. In this type of research there is always the possibility that senior executives are just providing the 'official' corporate view rather than a view based on their experience. Much of the case corporate behaviour has been confirmed by equivalent case work from the institutional side by Holland (1995) and Holland and Doran (1998) and by corporate studies by Marston (1993) and Barker (1998).

4. Private communications to institutional shareholders

The overall structure of the case companies communications model can be described through the following set of connected themes. These were:

4.1. Aims and objectives:

4.2. Costs and benefits and choice of disclosure channel.

4.3. Information released and a common agenda with institutions.

4.4. Constraints on disclosure.

4.5. Two-way exchanges and learning.

Diagram 1 links these themes in a schematic fashion. The themes are numbered according to the next five subsections.

Having established message, and channel 'solutions', the case companies conducted continuous and systematic communications, within the constraints, to achieve the aims of desirable state changes in the core institutions, analysts and the stock market. The case companies recognised that there was no single optimum communication solution, just a broadly acceptable range of solutions or behaviours, which satisfied the aims and did not compromise the known constraints on corporate communications. In the following subsections, the elements of the corporate private communications are briefly discussed[1].

4.1. Aims for private communications

The case companies argued that their corporate communications decision policies were driven by strategy and corporate financing policy. The primary corporate purpose was to improve corporate financing capability and defences against takeover threats. This led to the identification of communications aims in terms of desirable changes in financial institutional and analyst states. Enhanced states of FI confidence, knowledge and responsiveness were considered to be the intermediate stage by which the case company could partially achieve its objectives with respect

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[1] See Holland (1997) for a full discussion of the private disclosure process. Also see Holland (1998) for a complementary analysis of the private and public disclosure process within theories of financial intermediation and market efficiency as well as the analytic modelling literature on the supply of information to financial markets.

to the security market. The core set of FIs and analysts were seen as an important intermediation mechanism between the company and the 'market' made up of a large number of other investing FIs and other investors. By creating a common understanding of the company and confidence in its plans and management, in a core set of FIs, core analysts and media, the company sought to influence a vital part of the market. The hope was that this market segment would react speedily and in a well informed way and thus lead the rest of the security market's reaction, to new events or 'news' impinging on the company. The case companies were therefore creating a quick and informed response capability in the market.

In Case T: 'We don't have any problems with our UK financial institutions. This even keel with every one of our institutions is because our financial performance has been going well and, of course, this improves the nature of the relationships. Good relationships like these are especially important when the water moves a lot. For example, when the market suddenly changes or when there are merger waves. And the markets change a lot, the sentiment may not change too much against us because we have this solid core of institutions on our side. When there are merger waves we may have their help. It's a defence for when we wish to take somebody else over. The close contact with the institution means the market gets a better understanding of the value that's in the business, or the lack of it in a company. If you don't talk to them, then your credibility declines and the market takes the worse view.'

Public channels were also employed by the case companies to alter market states. Public announcements, and published financial reports, were used to enrich the market set of information on the company. This in turn was expected to alter prices. However, changing the share price in a desirable

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Diagram 1
The private disclosure process
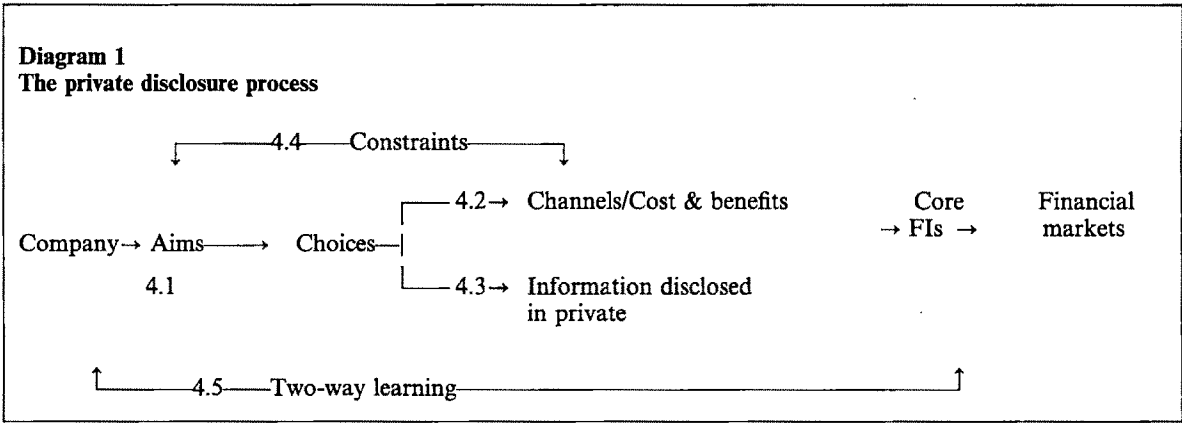
direction was considered unpredictable and difficult, if not impossible. The pragmatic aim was to try to enrich the market information set so that the price fully reflected the underlying economic reality of the business, and to build up more predictable market states such as knowledge and confidence in the company. These latter states were seen as vital given that the case participants argued strongly that the market was strongly driven by 'sentiment' as much as concrete economic information.

4.2. Corporate costs and benefits of 'City communications'

The case companies had to make decisions on communication channels used. A key decision here was how to choose core or relationship FIs (and analysts). A cost benefit calculation was used as a heuristic in this choice. The central cost benefit calculation lay in the cost of senior management time versus desirable state changes in FIs and in the stock market. However, the cost and benefits categories varied across the cases. The dominant cost was the perceived costs of chairman, chief executive, and finance director time spent on City communications, including opportunity cost of lost management opportunities. There were also costs identified for setting up an investors relations function, for purchasing information technology for observing news events and share price changes, and for following changes in the company's shareholder base. The case companies also incurred extra advisory, legal and administrative costs of compliance with stock exchange guidance. Additional costs arose from setting up internal training, and from writing internal company price sensitive information (PSI) codes.

The primary benefits sought included developing informed, confident FIs in 'least surprise' state, which in turn was expected to lead to stabler and more supportive shareholding and eventually to lower price volatility. Other incremental benefit categories varied across the cases, and included the perceived benefits of achieving high company credibility when releasing new information and the benefits of new management opportunities by spending so much time communicating to the City. These included new merger and acquisition ideas, and support for new security issues. Tighter corporate control over financial communications, once established, led to a perceived reduction in the risk of inadvertent release of PSI and a reduction in the risk of loss of reputation and of possible Stock Exchange sanctions.

There were some reductions in overall City communication costs as companies used the opportunity to concentrate their resources on core FIs and those analysts emphasising fundamental analysis. This resulted in a simpler, structured programme of contacts with FIs and analysts. The corporate cost of capital was initially expected to fall slightly as more information was in the public domain and investors faced less uncertainty in estimating company returns. This was considered to be a one-off benefit.

The costs and benefits of City communications were changing through time with external change in markets and in regulation. For example, there was continuing intense pressure from the market for information (consisting of FIs, analysts, and the media) to increase disclosure and thus to increase all communication costs. Regulatory changes had been quite dramatic in the period 1992–96. The case companies were therefore faced with a dynamic corporate decision process and a changing cost benefit trade-off. The following quote provides some more insight into these costs and benefits:

> In Case S: 'It's very difficult to quantify the benefits. We don't know what they are. ...We do an audit, we do a qualitative, not a quantitative, audit of investor relations by external consultants. They find out what the institutions think of the main issues of the business, the key people, etc. They'll also find out about the communications—what worked well and what didn't work too well. So, in a way we're assessing the benefits of communications in this sense. In terms of cost, the investor relations costs are negligible in a going concern of this size. It costs about £200,000 per annum, investor relations here, and this is in a business that has £900 million pre-tax profits. Therefore we think it's very good value for the money we spend.'

4.3. Information released and a common agenda with institutions

The case companies also had to make decisions on the information released through the private institutional channels so that they were consistent with the aims and constraint of City communications. This information was reflected in a common information agenda for these meetings. The case companies and FIs had their own similar rationales for defining the information agenda of the company-FI meetings. One reason for the similarity of the agenda was that companies internalised FI requirements and formed their communications around perceived FI needs. Another reason was that both parties generally agreed as to what information was required to understand corporate performance and to value the company. This common information agenda consisted of formal and informal components. The formal component consisted of, in part, the same private information agenda as the numbers in the earnings announcements and in the ensuing public financial

reports, as the text in the Operating and Financial Review (OFR), and as the contents of public announcements. However, this agenda was expanded in private as the company interpreted and explained this public domain information. Financial parameters such as dividend policy, gearing and debt structure were also discussed. They served as a means to signal and to indirectly discuss cash flow generating capability without discussing next period cash flows and earnings.

The informal component consisted of, in part, a very different information agenda from that employed for the public channels. It included information on qualitative company variables such as 'quality of management', strategy and its coherence, recent changes in these and in corporate succession and management style. Other information sources here included a supportive company climate for innovation and long term investment in productive and human assets, flexibility of company to technological change, and the role of internal financial resources in the above. Management attitudes to these variables, to profitability, and to return to shareholders, were also central to this part of the agenda. The informal and formal information agendas combined to form a much richer information disclosure content than the published financial report or any single disclosure mechanism, private or public.

4.4. Constraints on corporate private and public disclosure

The use of all major communication channels (reports, public announcement, FI meetings, analyst and media contacts), was subject to a range of constraints and controls. The latter arose from a regulatory or control system consisting of company and financial services law, self-regulatory bodies such as the Securities and Investments Board (SIB) and the Accounting and Standards Board (ASB), as well as pressures from the stock market, from industry competition, and from City social pressures. For example, an important constraint for all mechanisms was imposed by UK and EU insider trading law and the London stock exchange guidance on price sensitive information (PSI). Perceptions of competitive disadvantage and the costs of disclosures formed additional limits. The PSI area was problematic for case companies. Walmsley et al. (1992) found that the company meetings organised by the Society of UK Investment Analysts were associated with increased price volatility, and this was consistent with trading on privileged information derived from such meetings. Their research suggests that private company meetings with analysts and institutions arranged just after the results announcements also has potential for the release of price sensitive information and for insider trading. The

case companies were aware of this possibility and sought to ensure that all disclosure fell with the Stock Exchange guidance on PSI.

Holland and Stoner (1996) revealed how large UK companies initially faced problems in managing disclosure within these PSI constraints. They eventually established their own internal guidelines and were able to conduct private and public disclosure within these perceived limits. However, it is difficult to see how inadvertent releases of PSI could be avoided at all times during the intense and informed private FI-Co discussions. It is more likely that the private dialogue encouraged the regular release of PSI with very small price change significance. This accumulated over several meetings and other contacts into an FI understanding of a case company, which, if released in one parcel of information, would probably have a significant price impact as recognised by regulation.

These regulatory constraints combined with market failure conditions to define clear cut domains for public and private disclosure. In between these disclosure extremes was a broad area for corporate voluntary disclosure discretion. For example, parts of the informal and formal information agendas could not be revealed in public because of market failure. Companies could not reveal management quality, and did not wish to reveal innovation information or R&D knowledge in public. The FIs did not wish to ask their well researched, best questions in public. In both cases, the private knowledge would become a public good and lose value for the company, or FI and both would face the loss of major returns on their research efforts. This would remove the incentive to create the knowledge advantage and would constitute a market failure. Private closures through relationship channels were the only feasible means to disclose this kind of information. In contrast, parts of the informal and formal information agendas had been revealed in public because of Company Acts, the ASB and its GAAP, the stock exchange's listing requirements, the stock exchange's guidance on PSI and its rules on the avoidance of a false market in the company's shares. Companies had little choice here on disclosure channel (financial report or public announcements) or on the content of the disclosure.

In between the market failure and mandatory disclosure extremes lay a wide area for company discretion concerning public versus private disclosure choices from the informal and formal information agendas. The case companies had considerable discretion or degrees of freedom over disclosure content, mechanism, and the use of public or private domains. The information content discretion was thought to be much higher in the private meetings than via the more closely regulated financial reports and public announcements. The case companies could therefore choose to alter

the voluntary disclosure balance of informal agenda items between financial reports, public announcements and between these and private one-to-one meetings. In principle, the financial report could be extended by further explanations of how and why the current set of results were achieved. In practice, the case companies preferred to expand on the details in private. The Operating and Financial Review (OFR) could also be further expanded in the financial report. In practice, the case companies preferred to use the OFR's information agenda to form the basis of a further extensive dialogue within the private meetings. The case companies could also choose to alter the voluntary disclosure balance of 'soft' or qualitative information in the informal agenda items between semi public (large groups of FIs and analysts) and private one-to-one meetings. Again, the preference was to disclose the details in one-to-one meetings rather than larger group meetings.

4.5. Two-way exchanges and learning

The private communication process went beyond immediate information release between the parties. It also involved two-way dynamic exchanges between the parties which affected corporate strategy, FI fund management decisions, and created a dual knowledge advantage. The case companies were aware that they had to explain their strategy to their core FIs some time shortly after the earnings announcements were made. The case companies thought ahead to the FI meetings and timed their internal planning cycle so that they could have their most up-to-date strategic view ready for the external institutional communication cycle after the earnings announcements.

As a result, each case company had an extensive (board and top management) internal debate to identify and clarify strategy and the main message to be communicated. The existence of external FI monitoring sharpened up this process because senior executives knew they would have to communicate effectively during FI meetings and presentations. External advisers played a central role in this internal debate and helped the case companies to clarify their primary strategic messages and to script all senior executives in their understanding of strategy. The intention was that they should 'all sing from same hymn sheet' during the meetings.

> In Case W: 'Since 1990, I think I've seen major improvements in the strategy of UK companies and their ability to communicate the main strategic message. This is because the institutions have an increased opportunity to monitor companies and to get involved in the debate on strategy and I think the quality of strategy has increased as a result..... Twenty institutions seeing us and discussing our strategy, provide more information and

input into the strategy than one or two banks. They can also take a broader sectoral view and industry view as well as economy view and help us in this way. We therefore think they're quite a stimulus to us. They improve the quality of the internal company debate on strategy before we go out and discuss this strategy with institutions.'

The case companies argued that during these interactions, both parties were pushed up a learning curve, and this led to the creation of a dual knowledge advantage.

> In Case V: 'The opportunity to discuss matters with us means the institutions can piece together fragments of information in the way that individual investors cannot. The key feature of the private channel is that each core financial institution has a unique working model of us. It can therefore interpret the information in a way that is more meaningful than you or I. If major external events occur, such as the oil price fall, then these core financial institutions have a means of understanding this and interpreting this event better than less well informed investors and analysts.'

5. Financial reporting and the preference for private disclosure

This section explores how the case companies perceived problems with financial reports and how they recognised the relative communication advantages of FI relationships. These factors combined with regulatory constraints and market failure to encourage private voluntary disclosure. They also played a key role in corporate decisions concerning the relative voluntary disclosure balance between public channels (such as financial reporting and public announcements) and private relationship channels (mainly with institutions, but also with analysts and the media).

5.1. The perceived limitations of financial reports

The case companies identified a wide range of limitations of statutory financial statements. Many of these comments also referred to the interim announcements which had a structure based on the framework of published financial reports. A key point was that much of the information released in the interims and eventually published in the financial report was predicted beforehand by institutional investors and analysts. Surprises could occur with the earnings announcements, but the case companies experienced considerable FI pressure to ensure this did not occur. This announcement information was also fully assimilated by the FIs before the private meetings took place.

As a result, the contents of the financial statements were generally well known by the FIs before the private meetings and publication. In addition, the financial report had become too complex, too large, and too cumbersome for many users. The report was considered to be a source of information overload for unsophisticated users, with some companies reporting that their fund managers were reacting against the sheer scale and complexity of financial reports. The financial report was also tightly constrained by ASB principles and by increasingly rigid GAAP. It had evolved to serve multiple users and purposes and this created problems for the case companies when they wished to tailor the financial report to the perceived needs of institutional and other more specialised users. Finally, the financial report was dominated by financial data and variables and did not provide qualitative data on important areas such as management quality. As a result, it was not considered to be an effective mechanism for disclosing information on intangibles such as corporate knowledge assets and innovatory skills.

For example in the following cases:

In Case K: 'The question could be asked, if the financial report is so valuable as a source of information then why bother with meetings with institutions and analysts? The answer is that the financial report is becoming more obscure, more complex in its technical emphasis, and more detailed in its textual elements. Therefore it needs more explanation as to what the numbers mean and what the broadly stated OFR test means.'

And in Case R: 'Financial reports may obey the law but in fact they do not give a meaningful breakdown of what a business is about. In many cases they almost appear to be an art form in terms of the pictures they give of the company. It is the problems with this statutory requirement that has led to demands for information from other sources.'

5.2. Comparing FI-Co links and financial reports

In contrast to these financial reporting problems, the private company and institutional channels offered unique opportunities to release qualitative information which could not be disclosed through other means. For example, relationship contacts were a unique means to provide data on areas such as management quality. They also created gradual FI learning opportunities as opposed to the immediate market impact of public disclosures. Private FI-Co contacts had evolved to serve the specific and changing needs of companies and FIs. They were the means for ad hoc exchanges and for structured, programmed disclosures and exchanges. Companies and FIs could tailor the private agenda to their own disclosure or research needs. For example, FIs with long term holdings could seek long term strategic and management information to confirm their long term holding decisions. At the same time, both companies and institutions could tailor the meetings to avoid all reference to next period earnings and cash flow (Holland and Stoner, 1996).

Relationship contacts were also characterised as a 'boundary' communication mechanism with considerable managerial discretion. They were flexible and responsive to new types of events plus a means to privately communicated information about novel, fragmented events and for such fragmented, impressionistic information (non-price sensitive information) to be slowly released into the public domain through informed FIs. The relationship channels were also seen as a means of influencing and informing core FIs, so that they were less surprised by events and there was less price-sensitive information inside the company.

The case companies argued that the large recent increase in public mandatory and voluntary disclosures produced a 'snow job' or 'information overload' for FIs. Their core fund managers took a portfolio rather than sector view and could not digest all this corporate disclosure. The private meeting provided an opportunity for a precise and signposted summary by management, plus the opportunity for questions and an intensive dialogue. None of these were available from public disclosure routes such as the financial report. The limitations of financial reports and the comparative advantages of FI-Co communications both encouraged extensive voluntary disclosure of information through relationship channels. This private disclosure preference was also strengthened by the market failure in the production and exchange of soft or qualitative information, and by legal and social factors.

The private FI-Co meetings and other contacts outside of the financial reporting calendar were particularly important because of new company-specific events, industry or economy events which occurred at random and which had not been dealt with in the most recent financial reports. The mismatching between scheduled financial reports and the random occurrence of events of significance to the company and institutions meant that close corporate contacts provided a mechanism for companies to disclose, and for FIs to probe for, information as the events occurred. These contacts created very flexible corporate disclosure channels to core FIs, and company specific information search options for the core FIs. This effect was magnified across companies and FIs when the FIs had close contacts with several companies in the same line of business or industry.

The significance of this relationship or private disclosure process is that it makes clear that the

annual report has moved from being the sole and distinct information release event in a reporting year, to being an important, but somewhat limited, part of a continuous corporate disclosure process.

5.3. The preference for private voluntary disclosure

One way of investigating the boundary between private and public voluntary disclosure was to ask the case companies to consider the impact of a regulatory change to replace private FI-Co interactions with, say, a quarterly public meeting where the company reported on all qualitative matters. The view of case companies (and of FIs in Holland, 1995) was that if the one-to-one meetings became open, many of the relationship advantages would be lost and thus the public meeting would probably not release any extra useful information—it would be like a frequent AGM. The relationship parties would probably find other ways of establishing contact to bypass the public system to exchange private information and influence and this might create opportunities for insider dealing. It might also lead to the loss of recent improvements in the corporate strategy formation process and in fund management analysis process, as well as remove the dual knowledge advantage.

The case companies indicated that the private voluntary disclosure was of a higher quality than public voluntary disclosure. Very little qualitative information (including management quality and succession, management view of strategy and of competition, innovation as part of the information agenda), was voluntarily released into the public domain, and so this was a unique source of inside information for FIs. In contrast, the case companies placed a form of words in the public domain and this was related to the formal aspects of the private agenda. The same basic words or text were used in the documents for results announcements (where the text was much the same as the OFR when eventually published), and in the slides used in the private meetings after the announcements. The company then managed the private dialogue around the same basic words and could therefore claim that it was saying the same thing in public as in private. However, the slides and diagrams used in the private meetings were clearer, more conceptual and signposted the FI or analysts to the key parts of complex published documents.

This signposting became more important in the late 1990s as the financial report expanded and became more complex. If this signposting was added to the (10 minutes) of extensive discussion around the same set of words, then it was clear that greater understanding was achieved for FIs and analysts. This was much richer than the equivalent public domain disclosures and text. A case company could also claim that it had increased its public voluntary disclosure by placing the form of words in the public domain. However, it had effectively increased both private and public voluntary disclosure, with private disclosure being further developed by the existence of the public text. Using the same basic form of words in public and in private ensured that the company had a form of insurance against any legal challenge, but the information content of one published paragraph was very much less than that of the corresponding private exchange.

The preferences for private disclosure, the comparisons of disclosure channels and their interactions, the perceived limitations of financial reports and the uniqueness of private, relationship information, and other related themes were intermingled in complex ways in the cases. Case B reveals two common reasons for private disclosure:

'(in)...the face-to-face one-to-one meetings with the institutions, then obviously this is an opportunity to expand on all the other sources through a question and answer dialogue and is very interactive. But again, it's got its own unique agenda and we're now looking at the human information about the qualities of management and this type of thing.' And:

'The institutions do not go to AGMs. This is because of their formality and there's no information here for them. This is not a medium for the information they want to acquire. If you were to try to arrange meetings which involved a large group of institutions, then you wouldn't get the top people from the financial institutions. You wouldn't get Galley from Mercury Asset Management or Thomson from Standard Life. It's difficult to get together ten top people from ten top financial institutions. Their time is scarce and they wouldn't get much benefit from a large group meeting. They prefer the one-on-ones where they can ask their own distinctive questions. The only time you can get them together like this is if there is a big common issue about us affecting them all. What would happen if we were to close down the institutional company contacts? Well, there are two impacts. First of all, you'd fundamentally reduce the institutional understanding of their investments. Secondly, you would not stop insider trading. You would potentially increase it. This is because you would replace a controlled programme of contacts between the company and institutions with a series of informal, back door and talking-to-mates-in-the-pub system and this is much more open to abuse. So the current system is much better in this respect.'

6. The central role of financial reports in corporate communications

Despite these perceived limitations of the published financial report, the case companies identified a central role for the financial report in corporate communications. This arose because of five productive interactions between financial reporting and the private disclosure process. These were, first, the financial reporting cycle had a strong influence on the timing, content, and structure of the private process. Second, the financial report created a minimum disclosure benchmark for private disclosure. Third, information disclosed in the private process created novel learning opportunities for core FIs, and the case companies expected these FIs to be able to interpret new financial reports and unexpected events in an informed way. Fourth, the financial report, as an informed first layer of understanding, became a key means to 'look into' companies and understand their fundamental economic behaviour. Finally, by extending voluntary disclosure in the financial report, companies legitimised private disclosure.

6.1. Timing, structure, and content

The existence of the report, and the reporting cycle, provided the structure around which a whole range of private voluntary communications were made possible. The existence of quarterly, half yearly, or annual reports meant that the case companies, and their FIs and analysts were always thinking ahead to these reporting dates. Thus the reporting period set up a communication cycle for companies and an analysis, forecasting and valuation cycle for FIs and analysts. The financial reporting cycle also set up a private meeting timetable between the company and its core FIs, analysts and media. These meetings began with detailed presentations given to key FIs, analysts and the media just after the results announcements. Such presentations focused on the results alone but provided in-depth background information to support them. The slides were made available to those who wanted them and, in this way, the companies sought to avoid the release of PSI to a small number of privileged FIs or analysts. The imminent financial reporting period also set up a reference point for public announcements such as earnings warnings, or changes in key policies.

Financial reports also created a template for the form and content of interim and preliminary earnings announcements. The earnings announcements which were flashed on the stock exchange screen, normally at 7.30am before opening, were structured around the design of the eventual financial report. They contained the vast bulk of the financial numbers and much of the OFR text to be published in the report. Thus the design and content of the financial report determined much of the content and design of the earnings announcement. The latter was unaudited but was seen by company audit committees. From a market perspective, the announcement contained possible new information about financial performance. No extra information content, or abnormal return, was expected from the eventual publication of the financial reports based on the same announcements. This does not exclude the possibility that earnings announcements and published reports produced information which contributed to the market's ability to isolate and predict non-transitory earnings. Surprises on the non-transitory component of earnings would probably have a considerable price impact, but earnings confirming these non-transitory earnings would probably not have a price impact. Empirical research by Donnelly and Walker (1995) and Ashiq and Pope (1995) have confirmed that historic earnings figures do have information content for non-transitory earnings.

The financial report, in its published form and in its nascent form as an earnings announcement, performed an important function, prior to the complex private disclosures between the company and institution, analysts and media. In Section 4.3., it was shown how the financial report and earnings announcements created another template for the form and content of the formal part of the private meeting agenda. The role of the financial report was therefore more subtle than at first sight, especially in the way it structured a set of connected communication processes.

6.2. Benchmark role

The financial report also provided a baseline or benchmark source of information, both number-based and text-based, for institutional and broker analysis over many years. This baseline established a minimum level and pushed up the information level for all corporate communications to financial markets. All case companies expected to exceed this level in some way. The case companies used the meeting with each FI to expand on the financial report, and provided direct access to senior management and business sites. These created private opportunities to add to the information released in the report. If the financial report was not available, this reference point would disappear, and the extra information would probably not be released. Thus the financial report was thought to be central to corporate communications with the City.

In Case Y: 'The guidelines on the Operating and Financial Review are okay and we find this a useful means of exploring our position with our various constituents. We see the financial report as a milestone in itself as well as reporting on the achievement of various

milestones. It's an opportunity to take stock of strategic change over the past period. The OFR report has also been valuable to explain how and why we've arrived at this financial report. We can use the OFR to explain in more detail the recent turnaround in matching our cost cash flows with our cash inflows, as well as the general improvement in our balance sheet and in the profit and loss account. So we find the OFR quite useful in this respect. When we meet the institutions we can then begin from this starting point.'

The case companies argued that if the financial report did not exist then users such as FIs would lack a baseline to see how the future evolved and to use private meetings to ensure companies kept their promises. So even though it was not forward-looking in nature, it did provide a reference point to see how the future was unfolding. This meant that the financial report formed the basis to construct a time series history of corporate financial performance and promises, to compare companies in the same industry or risk/return group, and to simulate and forecast future financial performance states and compare them with the present. A historic narrative and a future-looking OFR were essential to explain how these numbers were arrived at and to use meetings to explore how they might change in the future.

6.3. Learning in an informed context

An active company and institutional dialogue on strategy, management quality and their impact on financial performance was a means to provide important learning opportunities for FIs. The case companies argued that the private one-to-one learning and disclosure process had a positive effect on future institutional shareholders' use of the annual report. For example, the extensive private one-to-one dialogue provided the means for institutional shareholders to place the earnings announcements and the published annual report within a wider explanatory context. The private one-to-one meetings were an important way for the case companies to 'signpost' their core institutional shareholders through increasingly complex and overloaded annual reports. One-to-one meetings were seen as the means for institutional shareholders to piece together data fragmented throughout the annual report, and in regulatory reports and announcements.

The case companies used private one-to-one meetings to overcome these reporting problems for their core institutional shareholders, and to ensure that institutional shareholders could independently read the financial reports in an informed way in the future. For example, the case companies would reveal their own in-house view of relevant cash flow categories and leave the fund managers and their analysts to fill in the details. If the fund managers still had problems interpreting the financial reports, they could use their 'relationship' access to phone the company and make a specific inquiry about the results and statements. Thus the relationship context and learning opportunities played a positive role in institutional shareholders use of financial reports outside of private meetings:

> In Case T: 'We really want the institutions to understand that the value of the company is based upon the future of the company. In particular, we think in terms of future free cash flows. The problem is how to get them to understand what these future, free cash flows are and how we intend to deliver them without actually speaking about the future free cash flows. Legally, talking about the expected cash flows for next year, the year after, is price sensitive information. We would like the institutions to have a clear understanding of what these cash flows are but they have to deduce it from our discussion of more qualitative variables. We hope that once they do understand it, those of them that are underweight will move up to market weighting. So, the main focus of the discussions is on the qualitative variables, the strategic variables which lead to forecasts of the free cash flows. We do not talk about the cash flows in particular. Or the discounted value of the cash flows. We leave all that to the institutions.

The case companies also used the voluntary disclosure component of the financial report to feed into FI learning processes concerning the case companies. Through time, this was thought to be part of the discretionary corporate means to push institutions up a learning curve. The mandatory disclosure component served a similar purpose but was not within the control of case companies. So the current report may have held few surprises, but it was expected to play a role in cumulative learning as small changes in strategy and performance were absorbed over many years.

Finally, the financial report was considered important in the initial screening of a company and in a new decision to invest. The financial report and broker's report dominated all other sources when relationships were new and untested. However, once the investment in learning was made, and regular FI-Co contacts conducted, the financial report became one piece of information among many, including relationship information, as the FI built up a complex mosaic picture of the company and its value.

6.4. Means to look into corporate economic behaviour

The case companies saw the financial statement part of the financial report as the 'front end' of a series of layers of understanding about the economic life of the enterprise. The next layer of understanding 'into' the firm constituted the Operating and Financial Review. This placed the financial statements within a more informed context. Both of these sources were part of a larger public domain picture derived from many sources and both were important ways of 'looking into' the firm. However, even these sources and ways of seeing were considered relatively superficial and the case companies experienced much deeper probing into their economic behaviour during the private meetings with their core FIs.

> In Case W: 'The key difference between the published financial reports and the presentations is that the reports are the completed 'meal'; the private presentations also tell how we prepared it. You can visualise the financial figures as a well understood two-dimensional matrix of information. We aim to use the presentations to get the participants to 'walk into the business' into the third dimension behind this surface. They get behind the figures and get to understand how the business eventually produced them. We hope that the presentation and the clear insight it provides into the heart of business makes it easy for them and they make their decisions and recommendations on an informed basis.'

The core FIs were thought to be trying to see through the 'veils' of public domain information into the heart of corporate economic behaviour. The FIs sought to see how this behaviour brought about the most recently published reports and statements. They sought to understand how this economic behaviour might change in the future and thus how the financial performances and results might change over time. When looking into the firm in this way, the FIs were perceived as using a series of 'intermediate' variables to understand the fundamentals of corporate financial behaviour. Thus 'management quality', coherence of strategy, ability to explain strategy, and succession policy were intermediate means to probe the fundamental nature of competitive advantages, of profit drivers, and what this meant for financial performance and value changes. They combined all of these fragmented sources of information into a more informed mosaic.

> Case G: 'The financial report is of course available publicly. There is not likely to be any extra information in here for the core financial institutions. There shouldn't be anything new here at all, they should know this

area fairly well. Perhaps the smaller, private investor might find the background information in the report of use to them. The financial institutions can collect lots of information from the financial report and other public sources, as can their analysts and they can throw it at management and then ask what does it mean? The information would be in fragments and pieces when collected from the public domain and the question to be asked of management, "How do these bits of data connect together?". In these circumstances the financial institutions would try to find out if the management logic makes sense and is clear when connecting the piecemeal data. If you like, one of the key things the financial institution will be trying to do is to probe the unknown areas and the gaps and try to piece the fragments together. So meeting management and looking at the financial reports and the other sources of information are means of getting a clearer picture of the underlying business.'

The case companies did not think their core FIs were seeking (or could seek) to understand the full 'blueprint' or propriety knowledge concerning innovation or new competitive advantage that was at the heart of corporate value creation. They were perceived as trying to acquire a 'broad understanding' of these corporate fundamentals and to turn this understanding into an informed valuation of the companies. The private meetings over many years provided the core FIs with an informed context to interpret new corporate information, especially earnings announcements, as they arose.

The above discussion reveals further insights into the symbiotic nature of interactions between FI-Co meetings and financial reporting. The financial report was a beginning point to look into the company and its fundamental economic behaviour. The learning that took place in the private FI-Co interactions was valuable in its own right. However, over time, it created a unique ability to predict and interpret financial results as they were announced. The learning created a joint financial reporting and FI-Co knowledge advantage and information access system, and this became an important means to observe the corporate future as it unfolded and to interpret its value and cash flows implications. As a result, the case companies and their core FIs have achieved many of the aims of layering and disclosure of future-oriented information recommended by MCRV (ICAS 1988). They have achieved these aims through the joint use of existing financial reports and the private disclosure process.

6.5. *Legitimising private disclosure*

As noted in Section 4, the financial report influenced the formal content of the private meeting agenda. Public disclosure also increased the legitimacy of private disclosure and broadened its scope.

> In Case S: 'We would say that we labour to put information out into the public domain. The financial report is a key part of that public dissemination. We also hand out the text of our broker's, analyst's and institutional results presentations. We take pride in these public releases. The group meetings with the institutions and the analysts are more or less public. By maximising this public domain information it makes it easier to discuss public facts in the private meetings and therefore to move away from releasing facts to interpreting and explaining the facts. This is a key distinction in our mind concerning communications. If you turn to the private meetings with the institutions, well there's no extra handout or pack in the private meetings. However we do refer back to the public document for the facts—the financial report and the presentation's pack. We then add much more commentary on this in the private meetings. So if you like, all the material we put out in the public domain, the factual public domain releases, acts as a benchmark or reference which we can add to and develop in the private meetings.'

The above discussion reveals the hidden roles of the financial report in corporate communications. The significance of the financial report in such roles would only become apparent if this reporting mechanism did not exist. The published financial report, although poor in terms of new information, created a structure around which private voluntary disclosures were much enhanced. Some of the reasons identified above for the value of financial reports are different from traditional reasons put forward by bodies such as the ASB or FASB. The latter bodies emphasise the benefits of the financial report for a wide range of users of public domain information. In contrast, the corporate reasons for the value of reports were about improving private disclosures to a limited number of core FIs, analysts and the media. They saw the financial report as part of a wider disclosure process.

Barker's (1998) survey results are similar to this case research in that he finds that formal and direct contacts with senior company management are the most important sources of information for fund managers, and that the report and accounts (especially the annual, though also the interim) are the second major source of information. Meetings with company executives were particularly important to allow fund managers to understand the strategy of the company, and to assess management's capacity to achieve the strategy. In addition, financial reporting was more important as a source of information for fund managers than analysts. The fund managers in the survey placed less emphasis on the timeliness of accounts (through announcements) than analysts and finance directors. However, they did value the annual report as a long term source of information for assessing the stewardship role and performance of companies. Trends in the annual report were interpreted over several years of company-fund manager meetings, with the annual report acting as an important point of reference for previous promises.

6. Conclusions

This research explored and described the little studied private disclosure world of UK companies as they communicated to their core institutional shareholders. The article revealed how private and public voluntary disclosure activity interacted. The private disclosure activity was recognised as a significant part of a larger corporate decision concerning public versus private voluntary disclosure. This was partially encouraged by the perceived limitations of the financial report. Despite these limitations the financial report was recognised as a central component of a larger corporate disclosure system.

Corporate private disclosure to institutions is likely to continue. The combination of market failure, increase information asymmetry due to rapid innovation, managerial bias, concentration of FI capital, and the limitations of public disclosure mechanisms will favour this. However, in 1998 the Hampel committee examined how to improve and formalise the UK corporate governance system. The role of institutional shareholders was recognised as central to the corporate governance issue. More specifically, the Hampel report emphasised its strong support for the Myners report (1995) on how to improve company and institutional communications. It placed particular stress on improving business awareness on the part of fund managers (pages 43–44). Thus the successors to the Hampel committee, plus the stock exchange and the ASB, could improve the transparency of the private disclosure process further by promoting a new research agenda based on the joint public and private disclosure process identified in this article.

Best practice in private disclosure could be investigated and communicated to all UK companies and FIs. This could also be used for improving financial reports. For example, the private agenda could be investigated to see how intangibles can be reported, and segmental reporting may be enhanced by exploiting private disclosure prac-

tices. The above regulators could also strengthen insider dealing law and exploit technological developments to improve transparency. For example, the times and dates of private FI-Co meetings could be made public, as well as FI share trades in the company. This would place FIs, as quasi insiders, on a level closer to director insiders and their trades. Corporate websites could be used to publish all of the slides and text used in private presentations to core FIs. This could be done at the same time as the post earnings announcement cycle of FI and analysts' meetings with the companies.

Such combined improvements in the financial report and public disclosure based on current private disclosure practice and increased transparency of the private disclosure process would together reduce managerial discretion and improve equity between all shareholders. A joint approach would also reflect the symbiotic private and public disclosure interactions observed here and satisfy the need to reform the wider corporate disclosure system rather than changing the system in a piecemeal way.

This article has indicated that the broader disclosure context in the UK had an important influence on the use and effectiveness of the financial report. This contextual influence may be unique to the UK and to other Anglo-Saxon financial systems. However, the way in which private disclosure interacts with financial reporting seems to be a general research problem within the EU members states and elsewhere. Unravelling this interaction will be central to understanding how the use of the financial report may vary between national systems, each with their own differing means for private disclosure to financial institutions.

Appendix 1

		FT Sector	**Jan 95 FTSE 500**			
Case	Industry		Rank range	Interview		Position
				length	period	
1	Diversified industrl		*500+	2 hours	9/95	Chairman
2	Engineering		200-210	1.5 hours	9/95	Finance director
3	Leisure and hotels		230-240	1.5 hours	9/95	Director of corporate affairs
4	Support services		170-180	1.5 hours	10/96	Finance director
5	Building & construct		260-270	1.75 hours	9/95	Group financial director
6	Electricity		110-120	2 hours	10/95	Director of IR
7	Electricity		50-60	4 hours	10/95	Chairman + IR director
8	banks, retajl		40-50	1.5 hours	10.95	Finance director
9	Brewry, pubs, restr		50-60	1.5 hours	12/96	Group treasurer
10	Alcoholic beverages		10-20	1.5 hours	2/96	IR director
11	Banks, retail		10-20	2 hours	3/96	Senior executive, Group IR + senior IR manager
12	Banks, retail		20-30	2 hours	3/96	Chief financial officer + IR director
13	Alcoholic beverages		10-20	2 hours	3/96	Head of IR
14	Banks, retail		30-40	1.5 hours	3/96	Group FD, IR director
15	Banks, retail		10-20	2 hours	3/96	Head of IR
16	Bldg & const		210-220	1.5 hours	3/96	Chairman
17	Diversified industry		10-20	2 hours	3/96	Chairman
18	Leisure & hotels		50-60	1.5 hours	3/96	Group treasurer
19	Transport		40-50	2 hours	4/96	Head of IR + Head of investor services
20	Diversified, industrl		130-140	1.25 hours	4/96	Finance director
21	Insurance		50-60	2 hours	4/96	Head of corporate affairs
22	Oil explor & prod		80-90	2 hours	4/96	Director of IR
23	Distributors		410-420	1.75 hours	4/96	Finance director
24	Retailers, general		30-40	2 hours	4/96	Director of IR
25	Distributors		60-70	2 hours	4/96	Investor relations manager
26	Telecom		10-20	2 hours	4/96	Head of Group IR
27	Building mats & merch		120-130	1.5 hours	4/96	Director of Group planning and development

Appendix 1 (continued)

	FT Sector	Jan 95 FTSE 500			
Case	Industry	Rank range	Interview		Position
			length	period	
28	Food producers	130-140	2 hours	4/96	Chief executive + FD
29	Retailers, food	50-60	2 hours	4/96	Deputy chairman
30	Retailers, general	50-60	1.5 hours	4/96	Director of IR
31	Insurance	40-50	2 hours	6/96	Group fin controller + IR Exec
32	Gas distribution	1-10	1.5 hours	6/96	Head of IR
33	Retailers, general	1-10	2 hours	6/96	Chairman and finance director

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Lead indicator models and UK analysts' earnings forecasts

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Abstract—This study examines the predictive ability of models which adjust random walk forecasts of corporate earnings, to incorporate past changes in economic lead indicators. The results suggest that changes in the *broad money* supply measure M4 contain predictive ability, beyond equivalent changes in other lead indicators or an individual firm's earnings. When forecasts from the broad-money model are compared with forecasts generated by financial analysts a size effect is evident: the superiority of analysts' forecasts is apparent much earlier for large firms than for small firms. This result is consistent with studies suggesting a size-related differential in the collection and dissemination of information by market participants.

1. Introduction

Interviews with analysts (e.g. Arnold and Moizer, 1984: 197) reveal that economy-wide data is often utilised in the assessment of general corporate prospects and in the prediction of earnings numbers. However, researchers' attempts to model the series for corporate earnings are usually *univariate* in nature, ignoring the potential for predictive gains to *macroeconomic* data.

The issue can be summarised as follows. The most simple time series model—the random walk—is low cost from the view point of researchers, and has empirical justification. Early studies of the time series for annual corporate earnings in both the UK (Little, 1962) and the US (Linter and Glauber, 1967) provide evidence consistent with a random walk process. Later US studies indicate that the series for quarterly earnings may be described by various forms of Box-Jenkins models (e.g. Foster, 1977; O'Brien, 1988), but in many countries, including the UK, quarterly earnings numbers are not usually disclosed.

Box-Jenkins models have not proved effective where only annual earnings data are available (see Watts and Leftwich, 1977: 269). More recently, the developing work on non-linear models (e.g. neural networks and chaos) has offered researchers additional tools for forecasting purposes. However, the large amounts of data needed for such procedures are typically not available for UK earnings

series. Although some work is developing in this area for US earnings series (e.g. Callan et al., 1996), some academics recommend caution in the use of such non-linear models where the number of observations is limited:

'Recent applications in economic and sales forecasting have sometimes tried to "get away with" as few as 100 observations, and this seems generally unwise.' (Chatfield, 1996: 209).

Because of data limitations, possibly no significant gains may be found by further development of univariate models.

An alternative approach to earnings forecasting is to widen the information set beyond the series of realised earnings, to incorporate variables which may possess lead indicator properties for economic activity. The use of indicator variables is widespread in economic forecasting (see Zarnowitz, 1992) but has been used little in accounting research.

An exception is a US study by Chant (1980) that investigates how random walk forecasts of corporate earnings may be improved by adjusting for past changes in lead indicator variables. Equation (1) shows how Chant applies changes in economic lead indicators, to the most recent earnings number:

$$\hat{A}_{t+1} = A_t (1 + \Delta I_t) \qquad (1)$$

where $\hat{A}_{t+1}$ = forecast of annual earnings for firm's fiscal year $t + 1$

A_t = actual earnings for firm's fiscal year t

ΔI_t = proportionate change in level of lead indicator over the 12 month period of firm's fiscal year t

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Thus, changes in the indicator variable during fiscal year *t* are assumed to be reflected in corporate earnings for fiscal year *t+1*. Chant uses three lead indicators: seasonally unadjusted money supply M1; the S&P 425 industrial stock index, and bank loans. Chant also uses two time series models that utilise only past earnings numbers: an exponential smoothing model and an average growth model. However, only the money supply-adjusted model proves significantly superior to the random walk. It suggests that past changes in monetary aggregates contain additional predictive ability over changes in a firm's earnings series, as represented by the time series models.

Chant's study is entirely empirical in nature; it tests the accuracy of models with no theoretical analysis as to the links between the money supply and income. This emphasis on empirical analysis is reflected in a number of macroeconomic studies which investigate the lead indicator properties of monetary aggregates for nominal national income and prices (e.g. Crockett, 1970; Astley and Haldane, 1995). The usefulness of lead indicators to policy makers and forecasters is that they provide accurate signals about future changes in target variables. Indicators may contain information not available from other variables, or they may encapsulate information which is only obtainable through a costly analysis of a wide range of other variables (e.g. interest rates, exchange rates, etc.).

For forecasters, it is obviously more convenient to examine the signals from a single 'lead' variable, rather than having to analyse a wide range of other variables to obtain the same signals. Thus, even without a detailed structural analysis, such studies are useful for identifying variables which may allow improved forecasting of the target variable.

Several empirical questions arise from Chant's US study of corporate earnings. Firstly, can the results be generalised to other economies, in particular the UK? Secondly, could the models be improved by using different lead times for changes in lead indicators? Thirdly, are the results sensitive to the definition of money supply? Fourthly, how do such forecasts compare with those generated by market professionals? These issues are investigated in the present paper.

The remainder of the paper is divided into four sections. Section 2 describes the data and forecasting models employed, and defines the error metric for this study. Section 3 describes both the methods utilised for error analysis, and presents the test results. Section 4 presents additional evidence and discussion relating to issues which flow from the main analysis. Section 5 is the conclusion.

2. Data, models and error metric

2.1. The data

The proprietary firm-specific data used in this study were provided by a large London-based stockbroking firm. The dataset includes earnings forecasts and revisions for the 23 months prior to an announcement, realised pre-tax earnings numbers, year-ends and market values for 580 firm-year observations, with fiscal years covering the period 1986–89, inclusive. No restriction is placed on the month of the year-end and the resulting sample appears representative of firms listed on the London Stock Exchange.

However, firms with negative earnings numbers are eliminated. This procedure is partly used to avoid the problem of calculating percentages of negative numbers, but also because evidence from US studies (e.g. Ali, Klein and Rosenfeld, 1992) indicates that for firms announcing negative earnings numbers, the earnings series has differing time series properties—specifically, very strong mean reversion. For these reasons, it is decided to exclude firms with negative earnings. This restriction reduces the sample to 565 firm-year observations (list available on request).

The earnings forecasts in the dataset are generated by individual analysts within the stockbroking firm, and are precisely time-dated. This means that at each monthly horizon, above 23 months prior to an announcement, the most recently created forecast can be identified. Many studies of analysts' forecasts use publication dates to date forecasts, but this approach is criticised by O'Brien (1988: 59) because of the lag between creation and publication, which O'Brien finds to be around 34 days. Thus, the use of publication dates could lead to the identification of out-of-date forecasts, for a particular horizon, biasing results against analysts.

The use of individual analysts' forecasts here instead of consensus forecasts (e.g. IBES) could be criticised. It could be argued that individual analysts' forecasts are susceptible to idiosyncratic error, which may be 'averaged away' in consensus forecasts. However, O'Brien finds that for a given horizon, the most recently created individual forecast is superior to mean and median consensus forecasts, suggesting that timeliness is a more important factor than idiosyncratic error in determining accuracy. An explanation for this finding is that consensus forecasts sometimes include stale forecasts, which can adversely influence accuracy. The potential problem of stale forecasts is also mentioned by Stickel (1989: 291) as a potential explanation for the findings of those studies that suggest managers' forecasts are superior to those of analysts.

The following economic data were collected from Dun & Bradstreet's *Datastream* information service, for every month from January 1983,

through December 1989: (a) bank and building society loans; (b) the *Financial Times* Stock Exchange 100 index; (c) the money supply M0; (d) the money supply M2, and (e) the money supply M4. For consistency with Chant, the money supply data are seasonally unadjusted. The money supply measure M0 consists of little more than notes and coins in circulation, plus banks' till money. The aggregates M2 and M4 also include a variety of deposit accounts. The measure M4 is currently considered the UK's main *broad-money* measure and M0 is the main *narrow-money* measure. These data comprise the candidate lead indicator variables examined in this study.

2.2. The models

The models used here build on those employed by Chant. The basic model is shown as equation (1). Here, the change in the lead indicator (ΔI_t) is calculated over the 12 months of fiscal year t, i.e. changes occurring over the fiscal year prior to the one being forecasted (year $t+1$). However, annual changes in lead indicators for lags of two and three years are also employed here, since lead indicators may lead economic activity by several years. Thus equation (2) to (4) are also employed here:

$$\hat{A}_{t+1} = A_t\,(1 + \Delta I_{t-1}) \qquad (2)$$

$$\hat{A}_{t+1} = A_t\,(1 + \Delta I_{t-2}) \qquad (3)$$

$$\hat{A}_{t+1} = A_t\,(1 + \Delta I_{GM}) \qquad (4)$$

where ΔI_{t-j} = proportionate change in level of lead indicator over the 12 month period of firm's fiscal year $t-j$

ΔI_{GM} = geometric mean of annual proportionate changes in the lead indicator such that

$$(1 + \Delta I_{GM}) = \sqrt[3]{(1 + \Delta I_t)\,(1 + \Delta I_{t-1})\,(1 + \Delta I_{t-2})}$$

and $\hat{A}_{t+1}$ and A_t are defined previously.

The final model, model (4), uses the geometric mean annual growth over a three-year period. This may be useful for lead indicators which are erratic in terms of year-on-year movements, but where the 'averaged' trend may be useful for predictive purposes.

2.3. The error metric

The error metric utilised here is the same as that used by Chant, and other studies of forecast accuracy (e.g. Basi, Carey and Twark, 1976; Brown and Rozeff, 1978; Patz, 1989); it is defined as

$$FE_{t+1} = \frac{|\hat{A}_{t+1} - A_{t+1}|}{A_{t+1}} \qquad (5)$$

Actual earnings is used as the deflator for the error metric in preference to a price based deflator like market value. For a study concerned solely with the measurement of accuracy, it would not be desirable to have differing error values for two firms which may have identical values for predicted and realised levels of earnings—and thus identical accuracy—but differing market values.[1] Some studies of forecast errors impose an upper bound on error values to guard against the influence of extreme observations; Chant (1980: 16) truncates all error values at 2.00 (i.e. 200%). For the purposes of comparability, this procedure is replicated here[2]; the impact of error truncation on the results of this study are not material. Repeating the analyses conducted here using unbounded errors generates almost identical results, and does not alter any of the main conclusions of this study.

3. Analysis and results

The analysis consists of two main elements. First, all lead indicator models are used to generate earnings forecasts for the 565 firm-year observations. Through statistical testing of forecast errors, the most accurate lead indicator model is identified. The second element of the analysis involves comparing forecasts from the most accurate lead indicator model, with forecasts generated by financial analysts.

3.1. A comparative analysis of the lead indicator models

The preliminary analysis of mean and median errors (omitted here for brevity) identifies the most accurate model form for each lead indicator. For the bank and building society loans model, the geometric mean growth adjustment (equation 4), is the most accurate model. This may be due to the 'smoothing' effect of using a three-year average growth value, because the series for bank loans is particularly volatile. For the FTSE-100 index model, it is equation 3 which is the most accurate. This latter result may be linked with the October crash of 1987. This study forecasts earnings numbers for 1986–89. Since equation 3 uses the longest lead time between indicator and earnings, the 1987 crash period would be omitted; even forecasts of earnings for 1989 year-ends would use the annual change in the FTSE-100, occurring up to the same year-end month in 1986.

With a shorter lead time (e.g. equation 1) the impact of the crash would be included in the fore-

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[1] See Basi, Carey and Twark (1976: 247) for a comment on price based deflators in accuracy studies. Capstaff, Paudayl and Rees (1995: 72) also choose to use earnings as a deflator.

[2] Mean errors for each model in Chant (1980: Table 1) are: M1 = 0.3018, S&P425 = 0.3102, Bank loans = 0.3279, Random walk = 0.3097.

casting model. Since output and corporate profits generally increased during the period 1988–89, low or negative growth adjustments to random walk forecasts are likely to lead to inferior forecasts. For the three money supply measures, Equation 1 is the most accurate, indicating a one-year lead over corporate earnings.

To test the significance of error differentials, both the 'paired' or 'matched samples' t-test (parametric) and the Wilcoxon Signed Ranks test (non-parametric) for related samples, are utilised. These tests compare forecasts from two models in a pair-wise manner, relating to each of the 565 firm-year observations to identify significant differences. These related-sample tests benefit from the fact that for each particular firm-year observation, the only source of variation in accuracy is the difference in the two models being compared. These statistics are used to compare errors for each lead indicator model, with the errors for a random walk model. For the paired t-test, the null and alternative hypotheses are stated below:

H_0: Mean error (lead indicator)—Mean error (random walk) = 0

H_1: Mean error (lead indicator)—Mean error (random walk) ≠ 0

The test is conducted as a two-tail test, since the lead indicator models could outperform or under-perform the random walk model. The Wilcoxon Signed Ranks test investigates a similar hypothesis, but since this non-parametric test is based on error rankings instead of means, the hypotheses are stated more generally as:

H_{0-}: Error distributions for lead indicator model and random walk model are identical.

H_1: Error distributions for lead indicator model and random walk model are not identical.

In Table 1, mean and median error values are presented for the unadjusted random walk, and the five lead indicator models. Both Wilcoxon Signed Ranks and paired t-test statistics are also presented, which provide a test of each model against the unadjusted random walk. Table 1 shows that the M4 money supply model generates the lowest values for both the mean and median errors, with the bank loans model proving the least accurate—reinforcing some of the findings of Chant's US study (see footnote 2).

Having identified the most appropriate form of model for each lead indicator, Wilcoxon Signed Ranks and paired t-tests are conducted to allow pair-wise comparisons between all the lead indicator models. This should allow identification of the lead indicator model with the most consistent performance. These test statistics are presented in Table 2.

The results in Table 2 provide further evidence of the M4 money supply model's superiority over the other lead indicators. The potential lead indicator properties of M4 are discussed later. The

'next best' model is the FTSE-100 index model. There are several reasons why the M4 money supply model may be superior: first, the lead indicator properties for stock indices have been subjected to some criticism, especially since the 1987 crash. Zarnowitz (1992: 354–355) describes how US studies from the early 1980s were generally supportive of the stock market's lead indicator properties for economic activity, but that studies from the late 1980s and early 1990s give mixed or negative results. Second, it may be that the money supply is more sensitive in reflecting very short term economic fluctuations that may have minimal impact on the value of the stock market, but which may influence the earnings for a single year. Thus, the money supply may signal short–term, temporary (i.e. transient) impacts on earnings numbers. Transitory components of earnings may have a noticeable impact on a single year's earnings, but (by their transient nature) are likely to have no significant impact on corporate valuation.

3.2. Lead indicator (money supply) model vs. financial analysts

In practice, professional investors obtain their forecasts from financial analysts. Analysts' forecasts offer a more demanding yardstick against which to test the performance of the money supply model. The model is tested against the most recently created analysts' forecasts available at short term horizons (8, 9, 10 and 11 months) and long term horizons (12, 15, 18 and 23 months) prior to the announcement of earnings for the fiscal year being forecasted. Generally, the 12-month horizon coincides with the announcement of the previous years' earnings[3]. Evidence from the US (Brown and Rozeff, 1978) and the UK (Patz, 1989) suggest that at horizons greater than 12 months, analysts' forecasts are not superior to random walk forecasts.

At horizons greater than 12 months, the data used in the random walk model (current year's earnings, A_t) have usually not yet been released, so such tests are biased against analysts to some extent. For horizons of less than 12 months, it would be expected that analysts should outperform a simple model, since the analyst has access to all the information contained in the model, including the relevant money supply data. UK studies by Bhaskar and Morris (1984) and Patz (1989) indicate significant analyst superiority over random walk forecasts, at horizons less than 12 months. Using the same statistics employed in the previous analysis—mean and median error, and Wilcoxon and paired t-tests statistics—the money

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[3] Inspection of the year-ends and announcement dates suggests little change in these dates for fiscal years t and t+1 for this data set.

Table 1
Lead indicator models vs. random walk model

Sample: 565 firm-year forecasts

Variables and models:

Error metric:	$|\hat{A}_{t+1} - A_{t+1}|/A_{t+1}$
Random walk:	$\hat{A}_{t+1} = A_t$
Bank loans:	$\hat{A}_{t+1} = A_t(1 + \Delta BL_{GM})$
FTSE-100:	$\hat{A}_{t+1} = A_t(1 + \Delta FTSE_{t-2})$
Money (MO):	$\hat{A}_{t+1} A_t(1 + \Delta MO_t)$
Money (M2):	$\hat{A}_{t+1} = A_t(1 + \Delta M2_t)$
Money (M4):	$\hat{A}_{t+1} = A_t(1 + \Delta M4_t)$

Where

$A_t =$	actual earnings for fiscal year t
$\hat{A}_{t+1} =$	forecast of earnings for fiscal year t+1
$\Delta BL_{GM} =$	geometric mean change in bank loans, for fiscal years t-2, t-1 and t
$\Delta FTSE_{t-2} =$	change in FTSE-100 index during fiscal year t-2
$\Delta MO_t =$	change in M0 money supply during fiscal year t
$\Delta M2_t =$	change in M2 money supply during fiscal year t
$\Delta M4_t =$	change in M4 money supply during fiscal year t

Model	Mean Error	Median Error	Model vs. Random walk: Wilcoxon Signed Rank Statistic	Model vs. Random walk Paired t-test Statistic
Random Walk	0.2628	0.2003	—	—
Bank Loans	0.2590	0.1506	− 3.51**	− 0.41
FTSE-100	0.2208	0.1101	− 7.73**	− 6.65**
Money Supply M0	0.2412	0.1616	− 10.39**	− 9.73**
Money Supply M2	0.2196	0.1196	− 8.84**	− 9.27**
Money Supply M4	0.2164	0.1071	− 8.20**	− 8.36**

Positive Wilcoxon Signed Ranks statistics and paired t-test statistics indicate superiority of a random walk model, compared to the model listed down the left side.
Negative values indicate superiority of the model listed down the left side.
All statistical tests utilise a two-tail test:
**indicates rejection of *null* (no difference) hypothesis at the 0.05 level.

supply model is tested here against analysts' forecasts.

If there is an analyst-model differential, there are reasons to expect it to be related to firm size (i.e. market value). There is much evidence that the collection and dissemination of information by market professionals is a positive function of firm size. Evidence from both share price returns and analysts' forecasts indicates that earnings announcements are relatively less timely information sources for large firms. Atiase (1985) and Bamber (1986) investigate variation in returns and trading volume respectively, around earnings announcements. The impact of an announcement on these variables is significantly greater for small firms than for large firms. A study of abnormal returns profiles by Freeman (1987) finds that for large firms, share prices begin to incorporate informa-

tion about forthcoming earnings announcements at much greater horizons than for small firms. Further evidence of this firm size effect is presented by Bhushan (1989a), who finds that the marginal information content of earnings announcements is a negative function of a firm's market value. Attempts to predict future earnings numbers using price data also reveal greater information content in the prices of large firms (see Collins et al., 1987).

Evidence of a size effect can also be found from the direct examination of earnings forecasts generated by financial analysts. Brown et al., (1987) compare analysts' earnings forecasts with forecasts generated by time series models. Analyst superiority is found to be a positive function of firm size. Stickel (1989) investigates analysts' revision activity around the time of interim earnings an-

Table 2
The relative performance of lead indicator models in pair-wise tests

Sample: 565 firm-year forecasts

Variables and models: See Table 1.

Model	FTSE-100	Money Supply M0	Money Supply M2	Money Supply M4
Bank Loans	+6.19**	+0.60	+4.99**	+6.32**
	+7.50**	+2.29**	+6.63**	+8.21**
FTSE-100		−6.23**	−1.45	+0.90
		−4.39**	+0.46	+2.25**
Money Supply M0			+6.59**	+6.01**
			+8.00**	+6.73**
Money Supply M2				+3.23**
				+2.25**

First statistic in matrix: Wilcoxon Signed Ranks test
Second statistic in matrix: Paired t-test

Positive Wilcoxon Signed Ranks statistics and Paired t-test statistics indicate superiority of the model along the top of the matrix, compared to the model listed down the left side. Negative values indicate superiority of the model listed down the left side.
All statistical tests utilise a two-tail test:
**indicates rejection of *null* (no difference) hypothesis at the 0.05 level.

nouncements; revision activity is negatively related to firm size, indicating that interim announcements for large firms are relatively less timely information sources. A number of UK studies, such as Patz (1989) and Capstaff et al. (1995), indicate that at a given horizon analysts' forecasts for large firms are superior to those for small firms. All these studies provide evidence of a size effect in operation with regard to information collection and dissemination. There are various factors that may explain this phenomenon:

(a) There are potentially greater financial gains for market professionals, in the identification of mispriced securities for firms with large market values:

'[K]nowledge that a large firm's common stock is mispriced by one per cent could be used to earn greater profits than information that would generate a one per cent adjustment in the market value of a small firm's common equity.' (*Freeman, 1987: 196*)

In addition, once an investor has identified a mispriced security, any trading activity is likely to be more noticeable (thereby revealing the informed investor's information to other market participants) for small or thinly-traded firms. Thus, the opportunities for profitable trading are likely to be more limited for small firms (see Freeman, 1987: 197–99; Bhushan, 1989b: 261).

(b) The greater economic incentives for large firms leads to analyst-following being a positive function of firm size. Analyst-following is modelled and empirically investigated by Bhushan (1989b). The increased analyst-following for large firms leads to increased competition among analysts. Trueman (1990) suggests that analysts may have incentives not to include all the private information they currently possess in their forecasts, resulting in bias and reduced accuracy. However, Cheung (1990) argues that this problem is unlikely to occur where there are large numbers of competing analysts, i.e. less likely to occur for large firms.

(c) The amount of information disseminated to investors through publications like the *Wall Street Journal* (which are more timely information sources than earnings announcements) is a positive function of firm size (Thompson, Olsen and Dietrich 1987).

The results of this study support the hypothesis that firm size is an important factor determining analyst superiority over simple models. Table 3 presents the mean and median errors for analysts, at the eight forecast horizons, and also presents Wilcoxon Signed Ranks and paired t-test statistics indicating how analysts compare with the M4 money supply model.

Table 3 shows that for the total sample of firms, the mean and median error values, and the test statistics, favour the money supply model where analysts are forecasting 15 months ahead or more. Only at the 12 month horizon is analyst superiority evidenced. Nevertheless the comparison of

Table 3
Forecast errors: financial analysts' vs. money supply (M4) model

All firms sample: 565 firm-year forecasts.
• Small firms = lower quartile of firm-years by market value (<£131m).
• Large firms = upper quartile of firm-years by market value (>£1519.37m).

Analysts' forecasts are examined at eight different horizons, relative to the announcement data which is available at around the 12-month horizon.

First statistic in matrix:	Mean error
Second statistic in matrix:	Median error
Third statistic in matrix:	Wilcoxon Signed Ranks test statistic (analysts vs. money supply model)
Fourth statistic in matrix:	Paired t-test statistic (analysts vs. money supply model)

	Analysts 23 months	Analysts 18 months	Analysts 15 months	Analysts 12 months	Analysts 11 months	Analysts 10 months	Analysts 9 months	Analysts 8 months	Money supply model
All firms									
Mean:	0.2713	0.2561	0.2350	0.1993	0.1893	0.1841	0.1706	0.1597	0.2146
Median:	0.1463	0.1186	0.1088	0.0850	0.0788	0.0725	0.0683	0.0625	0.1071
Wilcoxon:	−7.72**	−3.87**	−1.23	+5.29**	+7.18**	+8.16**	+9.35**	+9.86**	—
Paired t:	−6.44**	−4.59**	−2.35**	+2.33**	+3.84**	+4.48**	+5.88	+7.07**	—
Small firms									
Mean:	0.4149	0.4136	0.3963	0.3329	0.3169	0.3151	0.2876	0.2661	0.3293
Median:	0.2169	0.1755	0.1619	0.1089	0.1089	0.1057	0.0991	0.0991	0.1549
Wilcoxon:	−3.65**	−3.26**	−2.08**	+2.17**	+2.77**	+3.04**	+3.85**	+4.12**	—
Paired t:	−3.85**	−3.71**	−2.97**	−0.18	+0.67	+0.74	+1.965*	+2.89**	—
Large firms									
Mean:	0.1705	0.1595	0.1315	0.1248	0.1211	0.1144	0.1097	0.1047	0.1548
Mean:	0.1066	0.0816	0.0765	0.0643	0.0642	0.0568	0.0525	0.0517	0.0874
Wilcoxon:	−2.10**	+0.55	+1.949*	+3.26**	+3.84**	+4.16**	+4.57**	+4.86**	—
Paired t:	−1.09	−0.30	+1.961*	+2.71**	+3.03**	+3.78**	+4.25**	+4.59**	—

Variables and models: see Table 1.

Positive Wilcoxon Signed Ranks statistics and Paired t-test statistics indicate superiority of analysts' forecasts; negative values indicate superiority of the money supply model.
All statistical tests utilise a two-tail test:
**indicates rejection of *null* (no difference) hypothesis at the 0.05 level.
*indicates rejection of *null* (no difference) hypothesis at the 0.052 level,

large and small firm sub-samples illustrates an apparent firm size effect, similar to that documented in studies like Brown, Richardson and Schwager (1987); the superiority of analysts is an increasing function of firm size. For small firms, the first evidence of analyst superiority is detected at the 12-month horizon, where comparison of median errors and a significant Wilcoxon Signed Ranks statistics indicate analyst superiority. However, the paired t-test statistic and comparison of mean errors indicates little difference (indeed, a small superiority for the money supply model). In fact, for small firms, the paired t-test statistic only indicates 'borderline-significant' analyst superiority at the nine month horizon.

The results for large firms display a very different time-profile for accuracy. For large firms, the only evidence of model superiority is when comparison is made with the longest term analysts' forecasts, made 23 months prior to an announcement. Analyst superiority emerges as 'borderline-significant' at the 15-month horizon, for both the Wilcoxon and paired t-tests.

4. Discussion and additional issues

This section expands on a number of issues which flow from the main analyses of this study.

4.1. Do changes in M4 contain information beyond that contained in firm-specific changes?

In order to examine this question, a random-walk-with-drift (RWD) model is employed as an additional source of forecasts. The drift term in equation 6 is simply the previous year's growth rate for annual earnings. This model form has been utilised in a number of studies (e.g. Patz, 1989):

$$\hat{A}_{t+1} = A_t\,(1 + \Delta A_t) = A_t\left(\frac{A_t}{A_{t-1}}\right) \qquad (6)$$

where the variables are as defined previously.

The form of the RWD model in equation 6 mirrors that of the money supply model, except that the adjustment factor uses firm-specific data (i.e. earnings numbers A_t and A_{t-1}) rather than macroeconomic data. The RWD model can be compared with the money supply (M4) model, and with the simple random walk model, on the basis of mean and median errors, and Wilcoxon and paired t-test statistics; these results are presented in Table 4.

The results shown in Table 4 are mixed. The mean error and paired t-test favour the random walk over the RWD, while the median error and Wilcoxon Signed Ranks tests favour the RWD. However, when comparing the RWD and the money supply model, all statistics indicate the significant superiority of the money supply model.

This superiority over the RWD indicates that changes in broad money contain incremental predictive information, relative to similar changes in an individual firm's earnings over the same time period. This result is consistent with Chant, who finds that the money supply model outperforms models which utilise past earnings data (average-growth and exponential-smoothing models).

4.2. Money as a lead indicator for UK corporate earnings

An important point to note is that lead indicator variables need not cause (or be strongly structurally linked with) the target variable under study; all that is required is that they provide accurate signals regarding changes in the target variable.

> '[A]n indicator need not necessarily have any well-defined *steady-state* structural relation with the final target; it need only possess *short-run* information, which complements or extends the existing forecast information set'. (Astley and Haldane, 1995: 8).

Thus, the use of a lead indicator is acceptable for forecasting purposes even without a strong theoretical framework to link the lead and target variables.

Table 4
Random-walk-with-drift vs. random-walk and money supply (M4) models.

Sample: 565 firm-year forecasts

First statistic in matrix:	Mean error
Second statistic in matrix:	Median error
Third statistic in matrix:	Wilcoxon Signed Ranks test statistic
Fourth statistic in matrix:	Paired t-test statistic

Model:
Random walk with drift: $\hat{A}_{t+1} = A_t(A_t/A_{t-1})$
where variables and other models are as defined in Table 1.

	Random walk with drift	Random walk	Money supply M4
n = 565			
Mean:	0.3008	0.2628	0.2164
Median:	0.1207	0.2003	0.1071
Wilcoxon:	—	−2.68**	+5.22**
paired t:	—	+2.54**	+6.26**

Positive Wilcoxon Signed Ranks statistics and Paired t-test statistics indicate superiority of random walk or money supply model; negative values indicate superiority of the random-walk-with-drift.
All statistical tests utilise a two-tail test:
**indicates rejection of *null* (no difference) hypothesis at the 0.05 level.

There is much evidence that money aggregates act as lead indicators for national income measures and prices in the UK (e.g. Crockett, 1970; Breedon and Fisher, 1993; Henry and Pesaran, 1993; Astley and Haldane, 1995). However, providing a structural explanation for the lead indicator properties of money is difficult (Breedon and Fisher 1993: 31). Astley and Haldane examine the lead indicator properties of both M0 and M4 for a range of economic variables with a 12-month lag, using Granger-causality tests.

Their main results (Astley and Haldane: 49–50) indicate that M0 is a superior lead indicator for GNP, but a disaggregated analysis indicates that M4 proves an effective indicator for certain sectoral variables, including production industries output. A study by Dale and Haldane (1995: 1621), who analyse monthly UK data for 1974–92, concludes that in the short run, money sends timely signals regarding corporate output movements. This work will undoubtedly be extended in the future and may provide more detailed insights into the potential links between monetary aggregates and corporate sector activity/income.

4.3. Future research

The models employed here imply a simple one-for-one mapping of money supply changes onto earnings numbers which is almost certainly a simplification of reality. Indeed, lead indicators are usually chosen for their ability to predict the *direction* of trends and the *timing* of turning points for a target variable, rather than to predict the *magnitude* of changes. The fact remains that both this UK study, and the US study by Chant, indicate that these simple models can outperform the venerable random walk model (and average growth models), both in terms of overall mean errors and in pair-wise statistical tests.

The study of lead indicators through the predictive gains to augmented random walk models is a relatively simple method of analysis; it may be that alternative analytical methods may shed additional light on the relationship between lead indicators and corporate activity/income, although the lack of available data may pose a problem. For example, the use of the Granger-causality tests used in macroeconomic studies, or the incorporation of lead indicators into sophisticated time series models, may prove difficult when studying annual earnings numbers because of the low number of observations that can be collected for most UK firms.

Another aspect that may be considered is the impact of firm characteristics on the accuracy of lead indicator models. The results in Table 3 here show that the money supply model generates more accurate forecasts for large firms than for small firms (although analyst superiority is greater for larger firms). On the assumption that smaller firms are generally more risky, in terms of earnings variation and covariation with the market, it may be that this result illustrates the impact of risk on the effectiveness of the money supply model.

Because the money supply model used here is relatively easy for researchers to construct, and does not require information which may be unavailable in the UK (e.g. quarterly earnings numbers) or variable in quality (e.g. reported segment data), it offers an alternative yardstick to the much used random walk and average growth models for researchers investigating the relative accuracy of managers' or analysts' forecasts.

6. Conclusion

The results of this study suggest that a number of economic variables—particularly the broad monetary aggregate M4—act as lead indicators for UK corporate earnings numbers, across the period 1986–89. The results here show that a simple adjustment to a random walk forecast generates a significant improvement in accuracy. In addition, leading changes in broad money appear to contain greater predictive ability than equivalent changes in a firm's annual earnings. These results appear to confirm the results obtained by Chant (1980) for US companies across 1968–77, which suggest predictive gains to money supply data[4].

The performance of the money supply model, relative to financial analysts, is size dependent. For large firms, analyst superiority emerges at around 15 months prior to an announcement. For small firms, evidence of significant analyst superiority only exists at shorter horizons (indeed, only at the nine-month horizon when using parametric tests). This provides further evidence of a size-differential regarding information collection and dissemination by market participants. Overall, the results here suggest that the omission of economic data from the univariate time-series earnings models, frequently used in accounting research, may be a severe limitation to the predictive power of such models. For those concerned with the forecasting of corporate earnings, there may be greater gains from the further development of (relatively simple) models which use data additional to the earnings series, rather than the developing of ever-more exotic univariate models (e.g. non-linear models) of the earnings process.

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[4] Of course, Chant only considers the relatively narrow US monetary aggregate M1.

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The development of fixed asset accounting in South African gold mining companies: confronting the issues of prudence, matching, periodicity and capital maintenance

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Abstract—The 'Appropriation Method' of accounting applied by South African gold mining companies is fundamentally different from mine accounting elsewhere and results in reported earnings and asset values that are not comparable with those of mining companies in other countries. This paper traces the development of the Method, in an historical context, in an attempt to understand why, and how, it emerged and became established. Particular attention is paid to 19th century writings of local accountants, 'transactions' of professional bodies, and to the special characteristics of the South African gold mining industry. Transitional processes are illustrated by reference to the published accounts of the Crown Reef Gold Mining Company. The persistence of the Appropriation Method is a reminder that while assumptions of uniform accounting periods, matching, business continuity and the need for capital maintenance underpin most conventional accounting, nevertheless useful accountings can exist without these assumptions.

1. Introduction

For many years South Africa has been the world's largest producer of gold with annual output worth some $10,000m. The accounting policies that have developed in South African gold mining companies, over 30 of which are listed on the London Stock Exchange, have fundamental differences from those applied by mining companies elsewhere in the world. The central difference between what is known as the Appropriation Method (AM) and conventional accounting relates to the treatment of fixed assets.

The consequences of using the AM include:

• earnings figures which are overstated vis-à-vis those from gold mining groups elsewhere in the world (due to the non-depreciation of mining assets, but partly offset by the full write-off of renewals and replacements),

• a curb on the payment of dividends after any mining expansions (unless these are funded by in-creased share capital) while a mining asset reserve is built up and thereafter a tendency for a full pay-out of net cash receipts,

• balance sheets with mining assets stated at original undepreciated historical cost, and large non-distributable reserves.

Appropriation accounting recognises that expenditure on mining assets is often a sunk cost and these assets should not be looked to for the protection of creditors. It also avoids the unnecessary retention of surplus cash. However, shareholders do need to 'have their wits about them', especially towards the latter stages of a mine's life.[1] In recent times a recognition that the AM conflicts with concepts of going concern and matching, together with harmonisation pressures from the International Accounting Standards Committee, has led to several attempts to bring South African practice in line with that in the rest of the world.

The central purpose of this paper is to answer the twin questions: why and how did this unusual

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[1] 'Fixed assets are largely in the form of "a hole in the ground" and plant and buildings which will ultimately be of relatively little value....dividend declarations are...directly related to the annual profits until the end of the mine's life is drawing close. Consequently, the balance sheet is of little interest except in the early years and latter years of the life'. (Robertson, 1960: 56)

accounting system develop and become established? In particular, the paper explains the interpretations that late 19th century and early 20th century South African mining accountants placed on the fundamental conventions of prudence, matching, capital maintenance and the accounting period.

Section 2 contains historical background material with the aim of conveying a flavour of the dramatic way in which a speculative but capital-intensive industry erupted 'in the middle of nowhere'. These features, together with inherent risk, political uncertainty, a regulatory vacuum and the emergence of intermediary mining finance houses provided the environment in which the AM became established. The two central pillars of the AM, accounting for fixed assets and reserves accounting, are discussed in Sections 3 and 4 respectively. The intention is to provide an understanding of the distinguishing characteristics of the industry: the inappropriateness of the conventional annual accounting period, the special issues relating to uncertainty and matching, and why responses to prudence and capital maintenance concerns manifested themselves as they did. In order to illustrate the dynamics of the process of transition, reference is made to the financial statements and directors' reports of Crown Reef, a typical gold mining company of that time. Emphasis is also placed upon the writings of contemporary authors and the 'transactions' of professional bodies.

Taken as a whole, the paper seeks to provide an illustration of accounting practices that evolved usefully in response to specialised circumstances and requirements. This is in contrast to the late 20th century ambition of imposing, by regulation, accounting procedures derived from a conceptual framework.[2]

2. Historical development of the industry

In 1883 a 'gold rush' occurred in the Barberton district of the Eastern Transvaal. A stock exchange was soon established and investors in Britain fell over one another to buy shares. However, although there were several very rich pockets, only five payable mines survived and hundreds of thousands of shares were soon completely valueless. The critical event for the South African gold industry was the discovery, in 1886, of a gold-bearing reef stretching some 30 miles on the Witwatersrand in the southern Transvaal. There appeared to be an underground reef rather than

pockets of alluvial gold and the situation was unlike anything that most diggers had seen before. The diamond capitalists dominated the industry from the start and influenced the financing and organisational structure of the partnerships and companies that arose. As stated by Morrell (1968: 343–344):

> 'The Rand imported its capitalists ready-made from Kimberley. The gold rush was from the first dominated not by a crowd of men who wished to make their fortune but by a few who had already made it.'

Diggers and speculators did flood in but it was relatively difficult for them to get established. No one really knew where to buy, as shown by the fruitless £60,000 spent by Cecil Rhodes on the misleading evidence of pick-and-shovel work. Miners needed deep pockets as well as strong nerves.

> 'Even the smallest mines would need stamp batteries to crush the ore, steam-engines to drive the batteries, pumps to feed water to the claims, headgears, timber and amalgamation plants. Rhodes estimated that they would need at least £100,000 for their mines'. (Cartwright, 1967: 24–25).

Despite a speculative fever[3] and difficulties facing ordinary miners, gold was being produced. Shares began to be quoted on the Johannesburg Stock Exchange in 1887, in 1888 450 new gold mining companies were floated and by March 1889 the South African gold mining companies had a market capitalisation of £100 m. (Cartwright, 1967: 39, 52).

The boom was checked late in 1889 by the presence of pyritic ores in the gold bearing reefs. This made the extraction of gold much more complicated and expensive. Confidence was further sapped by President Kruger's refusal to allow a railway to be built and to reduce taxes on mining claims. There was a run on the shares of gold mining companies that was aggravated by banks calling in their loans. By 1892 confidence had returned owing to a new cyanide extraction process and the realisation that the gold-bearing rocks on the Rand were not isolated vertical outcrops, but rather tilted up sections of a massive basin of conglomerate. There was much more gold than had previously been supposed and it lay in reasonably accessible layers under land adjacent to the 'outcrop' mines. 'Deep-level' mining—intersecting underground reefs with vertical shafts and 'crosscuts' and 'drives'—was a dramatic development.

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[2] 'Accounting is not logical because of a philosophical origin or because of ideas persuasively deduced from predetermined premises. It is basically logical because it favors, among alternative ideas, those judged most likely to contribute best to recognized ends.' (Littleton and Zimmerman, 1962: 270)

[3] Dramatically illustrated by Kubicek (1979: 62): While the whole Rand produced gold worth £727,800 in 1888, Eckstein & Co., a local mining finance house, declared a net profit of £860,500 for the five months to December 1888!

Although gold production continued to increase—in 1898 3.5 m ounces were produced (Morrell, 1968: 362), the Jameson Raid[4] (December 1895) was the catalyst of an unsettled political period that culminated in the Boer War. The gold-mining industry remained in the doldrums until 1902. The remainder of the first decade of the 20th century was a period of stability with a consistent drive to improve the efficiency of mining methods and bring down that vital statistic, 'the cost per ton'. The most profitable mines in this period were Simmer & Jack and Robinson Deep, with profits for 1908 amounting to £683,000 and £468,000 respectively. In 1911 the industry entered another of its periodic slumps and by the end of 1913 the shares of Consolidated Gold Fields dipped to their lowest value (£2) in the history of the company. (Cartwright: 118).

2.1. Legislation

In 1871 the Volksraad of the South African Republic had passed what became known as the Gold Law. There was no reference to the keeping of financial records. The same was true of Law No. 5 of 1874 which limited the liability of members of certain companies to the nominal value of their shares. This did, however, provide that where the payment of dividends rendered a company insolvent, the directors were personally liable for the company's debts. The very brief Law No. 6 of 1874 incorporating companies formed 'for the purpose of prospecting for minerals, and to work the same' did not deal with accounting matters.

As regards record-keeping by the mining companies and the communication of financial information to shareholders, the government adopted a *laissez faire* attitude. But from the very outset shareholders were supplied with useful detailed information on a frequent and regular basis. Thus London investors were informed each month of the tons crushed and ounces of gold won and the Articles of Association of Crown Reef Gold Mining Company Ltd, registered with limited liability in the South African Republic in 1888, required audited accounts to be presented to the members every six months. Later investors became even better informed. 'The directors will from now furnish monthly reports to the shareholders giving the work done, the production and the detailed cost thereof.'[5] These included monthly revenue and expenditure accounts and also the average revenue per ton milled and average cost per ton milled analysed by each type of expenditure.

The beginning of professional regulation can be seen in the establishment, in 1894, of the Institute of Accountants and Auditors in the South African Republic. The Institute's first publication, Transaction No. 1, *Mining Accounts* by W.E. Steers, argued in favour of adopting a uniform system of charging costs.

3. Fixed asset accounting

3.1. A typical gold mining company

It is helpful to have a simplified picture of the typical main elements of establishing a Transvaal mining company around the turn of the 20th century.

a) Entrepreneurs bought land and/or claims to mine.

b) They then formed a company and sold the property rights and initial costs to the company receiving cash and 'founders shares' in lieu[6].

c) They issued the remaining authorised share capital. The general intention was to raise sufficient funds to buy the property and install the necessary permanent works and equipment.

d) The funds were then applied to digging the mine by following the ore-bearing seam down from the surface outcrop. The cost of digging the main shaft was generally capitalised and described either as Permanent Works[7] or as Development[8]. Expenditure was also incurred buying and installing plant and machinery.

e)[9] Once the main shaft had been sunk and the ore crushing and refining processes were in operation there was generally an attempt to 'close' the capital account. This meant that further minor development expenditure was funded out of revenue and not capitalised but charged as an operating expense.

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[6] An example is Gold Fields of South Africa Limited established by Cecil Rhodes and Charles Rudd, young men who already controlled the De Beers diamond mining company and had seats in the parliament of the Cape Colony. Rudd sailed for London in 1886 with the following instructions from Rhodes (reprinted in Cartwright, 1967:28):
• 'Get as much money as you can.
• Order a large quantity of machinery.
• Draw a trust deed with very wide powers.
• Obtain us a good remuneration or else the company is not worth working for.'
This flotation was successful; 100,000 1 shares were taken up with 250,000 being reserved for issue in South Africa. Rudd and Rhodes each received 10,000 'founders shares' and sold their property claims to the company at cost.
[7] e.g. Robinson Gold Mining Company.
[8] e.g. Crown Reef Gold Mining Company.
[9] Developments, in e) to h) such as the closure of the capital account, the non-depreciation of fixed assets and the appropriation of funds for capital expenditure, fully discussed later in the paper, are introduced here so as to provide a full sketch of the principal issues.

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[4] Colonel Leander Starr Jameson led an armed force into the Transvaal in an attempt to overthrow the Boer government. The plot failed but aggravated tensions between the mining industry and the government.
[5] Letter from chairman dated 18 October 1888.

f) The surplus of revenue, generated from the sale of gold, over operating expenses was paid out as dividends.

g) More often than not there came a stage at which a major expansion, e.g. the sinking of a second main shaft, was warranted. For reasons explained in Section 3.3. this was generally funded not by further share issues or by loan capital but internally from operating surpluses. These major expansions were too large to be charged immediately as operating expenses, and were capitalised as the mine development account in the balance sheet.

h) In such circumstances there was insufficient cash to allow all profits to be paid out as dividends, and this practice could not be resumed until the cost of the expansions was matched by a capital reserve appropriated from profits.

3.2. Non-uniformity of fixed asset accounting in the early years

A review of the balance sheets of several companies[10] in 1890 and 1891 shows that most companies disclosed the following separate categories of fixed assets:

Mine property, or Claims, i.e. the cost of purchasing the farm or the mining claim;
Water rights;
Permanent works (main shafts and cross-cuts), and buildings;
Mine development;[11]
Machinery and plant.

At this stage there is little evidence of what was to become known as the Appropriation Method, that is the practice of appropriating profits to a non-distributable reserve equal to the investment in fixed mining assets over and above the value of share capital raised at the outset. Amortisation policies did, however, vary greatly. The profit and loss accounts suggest that Mine property and Water-rights were generally not being depreciated and that rates of depreciation of Buildings ranged widely, e.g. from 5% p.a. (Ferreira 1891) to 15% p.a. (Robinson 1890, 1891). Permanent works were written off at between 7.5% p.a. (Ferreira 1891) and 33% p.a. (Robinson 1890, 1891). Rates of depreciation of Plant and machinery varied be-

tween 7.5% (Ferreira 1891) and 25% (Meyer & Charlton 1891). Mine development was redeemed on a tonnage of ore basis in one case (Ferreira 1891) and at 50% p.a. in another (Robinson 1890, 1891), not written down at all in a third (Jubilee 1890) and in some cases treated as an expense.[12]

The uncertainty regarding how much of the large sums invested in development and other mining assets should be written off posed a serious problem for any attempt at matching costs with revenues:

'In the unopened portions of the claim the assay value of the ore may change; the slope of the formation may increase or decrease, the ore sheets become thicker or thinner, overlap faults may double the reef...Any or all of these unknown factors may exist, and this possibility renders it impossible to say with accuracy what proportion of the total gold contents of the claims has been worked out, and consequently impossible to arrive at the amount of profit which the company in any given period has realised by its working.' (Pim, 1902: 7)

3.3. The case of Crown Reef Gold Mining Company Limited

Even within individual companies, policies changed from year to year as can be seen by following Crown Reef through from 1888 to 1899. In the first six months to September 1888 there was an unspecified write-off of Plant and Machinery included in Mining Expenses which totalled £4,000.0.0 exactly! The first financial statements were also curious for including the following item on the face of the balance sheet:

Permanent works: total cost	£6,221
Valued at	3,652
Less w/off to P & L	652
	3,000

By March 1892 the company had set up a Mine Development Account, to be written off at some unspecified rate against the ores extracted from each level of the mine. Non-mining fixed assets were depreciated at 20% and 25% in 1892, at undisclosed rates in 1894 and at only 5% in 1896.

The March 1894 Directors' Report includes comment very pertinent to the transition to the AM:

'The total amount to be expended above the capital provided will therefore be £92,346 which will be paid out of profits without in-

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[10] The annual reports, and in some cases half yearly and monthly reports of companies quoted on the London Stock Exchange (1880 onwards) are available for inspection at the Guildhall Library, London. Those studied for this paper include the Robinson Gold Mining Company, Jubilee Gold Mining Company, Gold Fields of South Africa, Crown Reef Gold Mining Company, Sheba Gold Mining Company, Ferreira Gold Mining Company and Meyer and Charlton Gold Mining Company.

[11] 'All expenditure on deepening of main shafts after they have reached the ore body, sinking of interior shafts, as well as all driving, cross-cutting (sometimes classified as Permanent works), raising, winz sinking, etc.' The Accountant, 1911: 743.

[12] '[C]harging all development costs against revenue, which obtains with some companies, cannot be fair and equitable for present shareholders, and is to the manifest advantage of future shareholders'. (Steers, 1894: 4)

terfering with the regular dividends of 50% per annum and your directors hope to relieve the company from debt during the course of the coming financial year....after the debt has been liquidated the whole of the company's profits will be available for distribution. Your directors are of the opinion that this policy will favourably commend itself to you rather than a policy of issuing debentures which would cost a large sum in interest; or a policy of increasing the capital which would be a perpetual charge against the profits of the future. Your directors propose in the future to write off development at a rate of about 10% per annum. The amount to the debit of the Mine Development account now stands at £21,219 in the Balance Sheet as follows:

1st level	Balance	nil
2nd level	ditto	nil
3rd level	Balance to debit	£8,891
4th level	ditto	£9,091
5th level	Cost to date	£3,112
6th level	ditto	£125'

Several points should be noted. First, there is an implication that, ideally, the initial capital raised should have been adequate for establishing the mine without resort to debt or further equity[13]. Secondly, the statement that the whole of the profits will be available for distribution shows that the company was, from the outset, seen as a finite-life operation, a view which later contributed to the argument that capitalising and depreciating mining assets was inappropriate. Thirdly, we can see that, although the transition has begun, Mine Development is still being redeemed as a charge against profits. Finally, the assurance of regular dividends of 50% confirms the confidence and profitability[14] of the operation, which was to make the change to non-capitalisation of expenditure on mining assets a possible option.

The Directors' Report for the year ended 1895 included the following statement: '[T]he policy of meeting the past year's capital expenditure out of profits...has been carried out'. The 1896 Report stated:

'As intimated in last year's Report the company's Capital Account is closed[15], all expenditure on account of Machinery, Plant, Buildings etc. being charged to Revenue Account during the past year. The amount standing to the debit of Mine Development Account will remain until the works which have been charged thereto are completed when it will be redeemed on a tonnage basis.'

The comment that the company's capital account was closed is relevant. Scrutiny of the Profit and Loss Account confirms that, in the year to March 1896, no further Mine Development was capitalised but current development was analysed functionally, not by mine level, and written off in full. From then on the only Development Redemption charge relates to pre-1896 development.

In 1898/1899 Howard Pim, one of the pioneers of the AM was appointed Crown Reef's joint auditor and the directors reported as follows:

'*Depreciation.* Since the value of the Machinery, Plant, Buildings etc. has been reduced to the amount of capital provided, your directors did not deem it advisable to continue writing off depreciation. The plant has been kept in efficient working order and several additions have from time to time been added, the costs of which have been charged with regular monthly expenditure.'

3.4. Observations by contemporary accountants and authors

In 1895 mining engineers Hatch and Chalmers had commented that diversity of accounting treatment was greatest in connection with mine development and depreciation. Some mines expended the cost of sinking and equipping main shafts at the end of every month, whereas others accumulated it in a suspense account to be recovered against ore extracted between each level. 'Generally speaking, the more prosperous a company is the more regular, systematic, and liberal it is in respect of sums written off'. (Hatch and Chalmers, 1895: 270). Indeed Matheson (1893: 44) advised that 'advantage should be taken of prosperous years to write down liberally the book value'.

At a meeting of the Institution of Mining and Metallurgy in 1897, Charleton expanded upon conventional treatment of the time:

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[13] Compare 'Managers of canal companies, and later railway companies, accounted for their stewardship by publishing a capital account which showed how capital was raised from the general public had been invested. Hatfield explains this practice on the grounds that "the law governing (statutory) companies provides that the money received on capital account,—that is from subscription to shares or from sales of debentures, etc.—may be used solely for investment in the plant of the company" (Hatfield, 1909: 48)' in Edwards, 1935: 22)

[14] In the company's first six months, on capital of £100,000, it had made profits of £13,060 and paid dividends of £6,000!

[15] The practice of 'closing' capital accounts was widespread in the British coal mining industry in the 1890s. See Boyns (1993: 333). However, as was the case in railways (Edwards, 1985: 28), closing the capital account was impracticable when obvious expansion opportunities presented themselves and the expenditure required was too great to be written off against current revenues.

'The amounts periodically written off permanent mine works...are always more or less arbitrary. At the Crown Reef the whole cost of sinking and equipping main shafts from one level to another is charged to the ore between these levels and redeemed by an estimated amount added to the cost of mining each ton extracted; at the Robinson the whole amount expended in shafts in any one month is written off....Many companies, however, are not so liberal, especially if the balance to credit is small. It is an extremely difficult thing to fix an equitable course in the matter of writing off main shafts, for although the shaft generally progresses in accordance with the requirements of the mine, the part first sunk is as useful and valuable in working the lowest, as in working the upper levels, and the life of a mine is always an element of great uncertainty.' (Charleton, 1897: 283–284).

Charleton confirmed the view of Hatch and Chalmers that depreciation charged varied between mines and over time. He noted that the Ferreira Company wrote off, in 1894, 20% to 25% from machinery, plant, buildings and permanent works whereas, in the same year, the Robinson Company wrote off only 5% (Charleton, 1897: 285). A reversal of the order of prudence that existed in 1890/91.

With the passage of time and the growing capital cost of establishing mines, the question of whether or not amortisation of development costs was appropriate or not became more pressing[16]. In 1898 Howard Pim[17], the first chairman of The Transvaal Society of Accountants, presented a paper in London entitled 'Witwatersrand Gold Mines considered as companies formed to work properties of a wasting nature'. The paper argued that a mining company should be treated differently from 'the case of a continuing business such as a bank or trading company, (in which) the capital is advanced for the purpose of carrying out an indefinite number of transactions extending over an indefinite period; in fact, the assumption is that the business goes on forever, while in the case of a gold mine or other wasting business the capital is advanced for the purpose of carrying out one transaction—the exhaustion of the claims' (p11). Companies of this 'character (are) somewhat uncommon in this country (England)...It is therefore not unnatural that these primitive concerns should

have been asked to conform to the rules laid down for continuing businesses, such as banks and other elaborate developments of our commercial system' (p15).

In particular, Pim argued that there was no point in providing depreciation, that a meaningful figure for profit could not be arrived at periodically, in which case matching ceased to be important, and that 'no objections sufficiently strong can be urged to prevent the distribution of funds arising from the companies' working irrespective of their being capital or revenue, and further, that there is no law to this effect' (p10). In considering the legality of what he proposes, he says (p.1) that most of the Witwatersrand mining companies were registered under 'the limited liability law of the South African Republic, a very simple Act, and work for gold under the Gold Law (No. 21 of 1896)'. Pim turns to British legislation for support for his thesis. The English Companies Acts 1862–1886 contained no references to wasting businesses.

'But in the Neuchatel case[18] the special conditions of wasting businesses are dealt with in...Lord Justice Lindley's judgment:– "It is obvious with respect to such property— mines, quarries etc.—every ton of stuff which you get out...may, from one point of view, be considered as embodying and containing a small portion of your capital....it is, I think a misapprehension to say that dividing the surplus after payment of expenses of the produce of your wasting property is...forbidden by the Act." (Pim, 1898: 16–17)

Pim's paper was not the first to advocate a different approach to accounting in mining companies. Almost a decade earlier in 1889 Bogle had presented a prize-winning paper in which he compared mining companies to 'single ship' companies

'formed to work one ship only, and the general practice is for the net earnings to be paid away as made, after deducting maintenance and some reserve for contingencies. Having regard to the fact that such companies are not of a permanent nature, and that when the ship is worn out, the raison d'etre of the company is gone, this practice has a good deal to recommend it, for the effect of reserving for depreciation in this case would simply mean that the sum reserved would be locked up in securities yielding a small rate of interest, for it could not be employed (as in the case of a general shipping company) in purchasing fresh ships. The shareholders should be plainly given to understand, how-

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[16] Edwards (1976: 307) makes the point that, until the closing decades of the 19th century, the low ratio of fixed to current assets in most industries meant that differences in depreciation policies were generally immaterial.

[17] Born in 1862 into an Irish Quaker family, studied at Trinity College, Dublin and served articles with Cooper Brothers in London.

[18] *Lee v. Neuchatel Asphalte Company* (1889). 41 ChD1. Reprinted in Brief (1976).

ever, that their capital is being gradually re-
turned to them.' (Bogle, 1889: 226).

Barely one month after Pim had presented his pa-
per in London, W.H. Dawe, the secretary of sev-
eral mining companies, addressed the AGM of the
Institute of Accountants and Auditors in the
South African Republic. His paper, entitled 'De-
preciation, Capital Expenditure and Redemption
of Capital' (1898) raised the fundamental point of
the valuation of the underlying property. Thus,
'whilst trouble has been taken to make these assets
appear to be carefully valued, the chief one, rep-
resenting the largest amount, has been left severely
alone, that is the property account'. (p.9). But once
the ores under the surface are exhausted the value
of the property reverts to the much lower figure of
farmland. He argued that to amortise development
and other mining assets, but not the cost of the
original claim, was confusing and pointless as a
capital maintenance exercise.

He held that while the 'single account' system
was suitable 'for mercantile undertakings where
there is a reasonable expectation of realising the
assets at the valuation stated' the 'double account'
system[19] used in railways should be adopted in
mining companies. Capital is provided for a given
purpose and 'the statement of the expenditure of
that capital is separated from the general balance
sheet, with the object of showing that it has been
legitimately employed in carrying out that pur-
pose' (Dawe, 1898: 11). The assets are always
stated at cost and it is assumed that all machinery,
plant, etc. will be kept in an efficient state. 'The
expenditure of the original capital will place a
mine in the position of a profit earning proposi-
tion. From that stage...maintenance will be borne
by the working costs...it strives to give sharehold-
ers the fullest information in the simplest way'
(p.16). As regards capital maintenance, Dawe
agreed with Pim that 'instead of allowing the com-
pany to act as trustee, shareholders prefer to act
for themselves and provide for the redemption of
their capital out of the increased dividends de-
clared'. (Dawe, 1898: 12)

In the year after the papers of Pim and Dawe,
Cox, the president of the Institution of Mining and
Metallurgy, stated that 'in view of the fact that the
shares in mines are constantly changing hands, I

do not think that any provision should be made
...shares should be looked upon simply as so much
paper entitling the shareholders to what dividends
can be made, and not as an ultimate asset when
the mine is worked out'. (Cox, 1899). Their ap-
proach was again stated clearly by Pim (1902: 8).
'the only figures which are facts...are their cost fig-
ures, and for this reason it is advantageous to al-
low these figures to remain unaltered in successive
balance sheets....If, therefore, no basis for depre-
ciation can be found which will enable us to arrive
at a reliable figure of profit, it is useless and mis-
leading to alter the figures of cost.' Another sup-
porter of this view was Denny, also writing in 1902
(pp. 91–92).

Between 1906 and 1911 there was much merger
activity during which 72 mining companies on the
Central Rand were absorbed into 20 consolidated
companies, controlled by only six groups.[20] It be-
came normal practice for finite life operating min-
ing companies to be administered, and largely
owned, by mining finance houses; a pattern that
still pertains. This rationalisation, and the prox-
imity of the head offices, encouraged standardi-
sation of accounting, and by 1914, the non-depre-
ciation of mining development costs had become
the industry norm. This can be seen from the fol-
lowing anonymous comment in *The South African
Accountant and Auditor*, December 1914: 133):

'It is one of the primary elements of the
Company Law of England...that a company
when paying dividends to shareholders must
retain its capital intact. It is, however, laid
down by recognised custom, supported by le-
gal decisions, that a company formed to
work a wasting asset is under no legal obli-
gation to do this; in fact, it is entitled to dis-
tribute all available income without making
provision for replacement or maintenance of
its capital assets...The man who invests his
money in a mine must know that his capital
is decreasing, and that when the mine is
worked out the only asset remaining will be
the scrap value of the machinery, etc. What-
ever cash is available after providing for cur-
rent liabilities he expects to be divided in the
form of dividend,...the capital expenditure
shown in the balance sheet means very little
so far as the value of his investment is con-
cerned, especially if the end of the life of the
mine is approaching.'

The contrast between what had become estab-
lished in South Africa and practice elsewhere may
be seen by comparing the preceding paragraph
with the following quote from Leake (1912:
141–142). 'The practice of including, without dis-

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[19] The double account system was recognised in English law
by the passing of the Act for the Regulation of Railways in
1868. Edwards (1985: 19) states: 'The companies required by
law to use the double account system disappeared in the spate
of nationalization following World War II, and to the best of
my knowledge no British companies continued to employ the
presentation.' Similarly, Brief (1966: 66) suggests that 'replace-
ment accounting, unlike many other nineteenth century ac-
counting procedures, is now considered an obsolete practice'.
It could be argued that South African gold mining companies,
listed on the London Stock Exchange, are still employing a
modified version of double and replacement accounting.

[20] See Richardson and van Helten (1984: 339).

tinction, capital and income in the annual dividends paid to shareholders is becoming increasingly inconvenient, and the custom is probably largely responsible for the long-continued refusal of the Income Tax Authorities, when assessing income tax on such undertakings, to allow deduction from the annual revenue receipts of the necessary provision for wasted capital, with the result that income tax is paid by this class of undertaking on capital as well as profits.'[21] In England, wear and tear had been allowed as an expense in calculating tax liabilities in most industries since 1878 (Brief, 1976: 173) but after the *Coltness Iron Co. v. Black* decision (1881) a charge for the depletion of wasting assets had not been permitted. In South Africa the tax position has always been somewhat different: 'The bulk of capital expenditure is immediately deductible in the same way as non-capital expenditure....classification of expenditures as capital and non-capital is a matter of indifference for tax purposes.' (van Blerck, 1992: 12.33). In Australia Herbert Hoover argued that 'working costs would be distorted if development was expensed as incurred—which had been his firm's accounting practice....Therefore, Hoover recommended that development costs should be capitalized and amortized.' (Vent and Milne, 1989: 67.) And the cases discussed by Wale (1990) suggest that, in the British coal mines, consistent depreciation policies were being established by 1911.

4. Transfers to non-distributable reserves and the payment of dividends

In consequence of the efforts of Pim and others it became conventional practice not to amortise the values of mining assets of South African gold mining companies. By this device the mine managers avoided the complications of having to estimate likely future tonnages of ore and mine lives and investors were able more easily to make comparisons between the profits of different mines on the Witwatersrand.

Non-depreciation did, however, hold obvious dangers for shareholders, creditors and directors. Inflated profits could allow feckless directors or controlling shareholders to pay excessive dividends, temporarily boosting the share price, and sell their shares leaving companies with severe liquidity problems. Furthermore, if working costs rose or the reefs became significantly less productive, the mine might be forced to close prematurely. In such a case the original share capital might no longer be represented by realisable assets which could be used to pay creditors, i.e. the share capital 'buffer' which creditors can generally rely upon, where capital is maintained intact, would

not exist. Thirdly, where profitable mining companies accumulated retained profits but applied the funds to expand the mine, the directors were liable to be pressurised by shareholders who assumed that reserves were equivalent to cash which could and should be distributed as dividends. Finally, if all operating surpluses were shown as distributable profit and paid out as dividends this might have attracted a higher tax burden from a hostile Boer government; especially so in view of the generous treatment which allowed most capital expenditure to be charged, for tax purposes, against revenue in the year in which it was incurred.

While, with the support of *Lee v. Neuchatel*, depreciation was not re-introduced, in order to counter the dangers mentioned above and provide a measure of prudence, an alternative form of depreciation[22], i.e. an appropriation of profits rather than a charge in arriving at profits, was implemented. It became conventional to transfer (appropriate) to a non-distributable reserve a sum which, when aggregated with share capital, was equal to the figure representing initial expenditure on 'mining assets'. Nowadays, in most industries, companies may pay dividends out of profits up to the value of P in the equation below:

$$P = FA + NCA - LTL - (SC + NDR)$$

where FA = Fixed Assets, NCA = Net current assets, LTL = Long term liabilities, SC = Share capital and NDR = Non-distributable reserves.

The Appropriation Method required that FA−(SC+NDR) = 0 so P = NCA−LTL

In other words, profits could only be distributed after creditors and long-term debt had been fully covered by the value of non-mining assets. This prudence was justified on the grounds that expenditure on mining assets was a sunk cost and could not be relied upon to satisfy the claims of lenders. The concern, by directors, for the welfare of creditors may be explained as having been a necessary 'bonding' in a high risk environment but was, no doubt, also related to the 1874 legislation which held directors personally liable for any debts of companies that went insolvent owing to excessive dividends.

The method was also cautious in that incremental development expenditure incurred after the initial opening up of the mine was not treated as an asset but expensed immediately. Once the reserve was large enough all surpluses were generally distributed as dividends. If, after the first few years, mining became uneconomic and operations ceased, the maximum loss that shareholders would suffer from having sunk money in highly special-

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[21] See Edwards, (1976: 308).

[22] Not a systematic allocation of historical cost—the amount transferred each year was dependent only on the size of profits.

Figure 1
Capital and liabilities section of Crown Reef's balance sheets

	1894	1896
Capital Account	120,000	120,000
Share Premium Account	116,187	116,187
Revenue Account:		
revenue appropriated for working capital	20,000	20,000
Reserve Fund appropriated for working capital	-	27,121
	136,187	163,308
Reserve Fund	18,113	6,021
Sundry Creditors	20,140	12,728
Bills Payable	5,188	2,248
Bank	63,859	29,208
Unclaimed Dividends	225	406
Profit and Loss Account	44,419	130,848
	408,131	464,767

ised assets was the original share capital plus the non-distributable reserve. Lenders were protected and, on cessation of mining, the full balance of distributable reserves could be paid out as dividend. In contrast with normal practice in other industries, the original capital, plus funds applied to major subsequent expansions, was seen as committed and sunk and emphasis was placed, instead, on ensuring that distributable profits could be paid as cash.

The features of the AM did not all appear simultaneously or consistently across the South African gold industry. Even in England and America there was considerable uncertainty about the exact meaning of various terms. According to Brief (1976) there seems to have been some agreement that the principal purpose of depreciation was to recognise the diminution of asset value. However, for a long time there was a widespread view, across all industries, that depreciation was set aside out of profits. 'Depreciation charges are thus variously regarded as...a deduction from operating income (or) profits reserved or placed in surplus.' (Hatfield, 1922: 375). Dicksee (1915: 256) argued against 'the method adopted by many companies of stating in their published accounts a so-called "Net Profit" out of which it is proposed to set aside a certain sum for Depreciation and Directors' fees—a true net profit can only be arrived at after charging all expenses'.

4.1. The case of Crown Reef Gold Mining Company Limited

At Crown Reef the first reference to a reserve involved 'expenditure' of £5,300 in the 1892 Statement of Receipts and Expenditure. It was shown as 'Reserve Fund' but since it was represented by an identified bank deposit account, and was set at 10% of dividends, it appears to have been more of

a dividend equalisation reserve than an alternative to amortising mining assets. This is supported by that fact that that year's Profit and Loss account contained a separate transfer to an account for the redemption of Mine Development.

By March 1894 the Reserve Fund had grown (at the continuing rate of 10% of dividends) to £18,113 but was no longer represented by a special bank account. More importantly, a new line 'Revenue appropriated for working capital' had been introduced. The 'Capital and Liabilities' section of Crown Reef's balance sheets took the form shown in Figure 1.[23]

The sub-total of £136,187 (1896: £163,308) implies that the £20,000 was seen as being akin to share premium and not destined to become dividends in due course. Even the Reserve Fund was changing in nature from being a simple cash accumulation for smoothing dividends. In 1894 the directors stated:

'It will be noticed that the Company's Reserve Fund (£18,113) is not at present invested in a separate fund. The bulk of the amount (£12,995) is invested in stores and materials in this way relieving the working capital[24] which would otherwise be locked up in the stock of stores.'

The 1896 Directors' Report explained that:

'Your Directors have transferred the Reserve Fund which had been built up by transferring an amount equal to 10% of Dividends No. 6 to No. 14 (amounting to £27,121) to

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[23] Balance sheet figures have been rounded and narrative condensed where material is not centrally relevant.
[24] The term 'working capital' does not, in this context, mean net current assets but rather the extra capital funds applied to mobilise the basic mining assets.

the working capital account, since the working capital provided falls so much below the expenditure which has been made. The Reserve Fund (£6,000) set aside on payment of dividend No. 15 however has been invested in a separate fund.'

The asset side of the balance sheet shows that the reserve fund was, in this year, reflected by £6,000 of British Consols (plus a residual £21 in the Union Bank of London).

The Reports and Balance Sheets provide support for the comment, made earlier in the paper, that the original share capital should have been adequate for getting the mine up and running (and the corollary that directors had authority to spend this, and were in a sense less accountable for that original sum). Thus, the Reserve Fund of £18,113 (£6,021 later) is not separated from Sundry Creditors by any subtotal but is an amount 'owed' to shareholders. Also, there is a suggestion that directors have to 'filch' the £20,000 (and then a further £27,121) but feel justified in so doing because expenditure on mining assets has exceeded expectations. In modern terminology they are transferring the amounts to non-distributable reserves.

Section 4 has shown the early development of the second main pillar of the AM, i.e. appropriating

'from profits within the life time of the mine such amounts which, together with the paid up share capital (and share premium account) will equal (be approximately equal to) the expenditure on mining assets. Profits so appropriated are not therefore available for distribution to shareholders'. (Transvaal Society of Chartered Accountants, 1974).

5. Confronting accounting conventions

With a view to pulling together the various strands of this paper, we may ask why the particular forms of accounting developed as they did.

The historical review in Section 2 touched on the following important distinguishing features of the South African gold mining industry:
• its profitability;
• its riskiness arising out of the capital requirements, the inherent risk of not finding payable ores, and the sunk cost nature of the assets;
• the attitude of speculation inevitably associated with such high-risk ventures.[25] *The Economist* (25/9/1886: 1,194) stated 'those who have money they can afford to lose may speculate in them as they would a lottery...no prudent man who is de-

pendent for his living upon the return of his capital would feel warranted in touching them'.
• the period of history in which South African gold mining became established, and in particular its stage of development at the time of the important *Lee v. Neuchatel* case of 1889;
• the fact that the industry was controlled by mining financiers with portfolios of mines of limited capacity rather than by collectives of miners perpetuating individual companies by seeking new claims. Thus companies were formed to exploit specific claims, each of which was seen as a single transaction. 'In South Africa the finance houses were the organisational forms through which risk was spread.' (van Helten, 1990: 177);
• as gold mining was the main economic activity, the local accounting profession was concerned, first and foremost, with mining accounting. This gave them a free rein in this area. Unlike in other countries, mining accounting policies did not need to be completely consistent with those of 'normal' commercial enterprises.

The discussion below explains how these features may have influenced the development of the AM and led to an effective context-specific response to issues of prudence, matching, periodicity and capital maintenance.

5.1. Prudence

It is normal convention for expenditure on fixed assets to be capitalised and then charged against revenues over the assets' useful economic lives. To the extent that depreciation approximates the diminution in assets' exit value, balance sheets will provide some indication of the value of an enterprise. The depreciation charge also means that profits reflect an increase in wealth rather than just a cash surplus. A third effect of depreciation is that, by reducing profits, it restricts dividend payments thereby ensuring that share capital and liabilities are covered by the value of assets that may be declining.

In the case of mining, however, money spent on fixed assets is, to a large extent, irretrievably sunk. Proponents of the AM took the view that to depreciate mining assets would be misleading[26] and

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[25] Throughout the period 1887–1965, while the top 36% of the companies provided equity yields of above 10% p.a., a full 35% of the companies gave negative returns to capital. (Frankel, 1969: 19–24).

[26] A view later supported by Chambers: expenditure on mining assets 'should be removed forthwith from the body of information representing funds accessible for the payment of debts and the continuation of operations. Any practice or standard which entails that the amount should be included in a statement of financial position will lead to misrepresentation of financial position. ...(Requiring) that the amount be amortized over some period will also misrepresent financial position; for it entails that only part of the total outlay has become "inaccessible" in the period, or "lost" as far as future financial operations are concerned'. (1979: 4–5)

Figure 2
Extract from Crown Reef's 1896 balance sheet

Capital account		120,000	Mine Property		100,000
Share Premium account	116,187		Property account	2,912	
Revenue account:			Water Rights & Reservoirs	9,859	
revenue appropriated					
for working capital	20,000		Machinery & Plant	124,789	137,560
Reserve Fund appropriated			Buildings account		21,486
for working capital	27,121	163,308	Mine Development		24,261
		283,308			283,308
Reserve Fund		99,926	Reserve fund		99,926
Sundry Creditors		7,273	Slimes Plant		2,096
Bank		3,040	Buildings & Permanent Works		1,690
Unclaimed Dividends		60,222	Quartz account		76
Profit and Loss account		33,325	Other sundry assets		99,998
		487,094			487,094

would imply that they had a resale value[27]. It would also incorrectly imply a close causal relationship between cost and income, whereas 19th century mining wealth arose largely out of the chance event of finding ores. Finally it would incorrectly suggest that the useful life, or ore reserves, of a mine could be determined. 'It must at once be admitted that any of the known methods of depreciating mining property must be absolutely speculative and probably highly misleading.'[28] This contention is supported by the non-uniformity exposed in Section 3.2.

The most prudent response to this dilemma would have been to charge all expenditure against current revenues. This would however have been a radical departure from normal practice[29] and the consequent losses reported in the initial stages of a mine would have destroyed shareholder confidence. In order to maintain confidence, and to fulfil what they understood to be their stewardship responsibility, the directors wanted the balance sheet to show how the initial money had been spent, i.e. acquiring claims, purchasing and installing machinery, sinking main shafts and erecting buildings. In many cases these items would have got into the books as expenditure by the promoters **before** going to the market for share capital. They needed to be shown to indicate the promoters' input and to provide confidence for investors.

'The method of treating sums expended for plant as current expense is manifestly unfair to the management desirous of making a record in the matter of mine costs' (Jenkins, 1902: 707).

In view of the problems with depreciation and a need to have assets on the balance sheet, a variant of the double account system presented a way forward. The balance sheets of Crown Reef from 1896 onwards are of a double account type[30]. See for example the 1902 extract shown in Figure 2.

Because depreciation was not provided it was logical that the cost of replacements was written off. Furthermore, there was a natural antipathy to mines capitalising further expenditure, other than in respect of clearly distinct and significant expansions. There was a general expectation that the equity originally raised should be adequate for opening up the mine. Shareholders thousands of miles away were understandably suspicious that directors would try to cover up inefficient or fraudulent management by showing valueless expenditure as an asset rather than as an expense[31], thereby disguising losses and perpetuating their tenure. From the perspective of distant shareholders the original capitalisation was a finite quantum that was expected, and could be tolerated, but they did not wish to give directors an unlimited mandate to dis-

[27] The 1902 Crown Reef balance sheet in Section 5.2 distinguishes between 'sunk cost' mining assets above the line and other fixed assets below the line. The 1905 directors' report explained a decision 'to provide' not only for mining assets but also 'for buildings and permanent works **other than cottages**'. This recognised that specialised buildings and permanent works above ground are a sunk cost whereas miners' cottages could have an intrinsic value unrelated to the life of the mine.

[28] Leading article in *The Accountant*, July 7 1898: 686.

[29] Furthermore, as in the case of the railways (Edwards, 1985: 29) the sums were too large to permit immediate write-off.

[30] Dicksee, 1903: 126, argued that the principal benefit of the double account system's capital account was in enabling 'even those who are unacquainted with scientific bookkeeping to readily discern to what extent moneys received from shareholders and debenture holders have been applied in the acquisition of fixed assets'.

[31] 'Given an unsatisfactory property, it is easily understood that directors and manager alike desire to present its financial position in the best possible light by adopting the simple plan of charging every outlay they can to capital expenditure' (Dawe, 1897: 6).

guise sunk costs, that might not bear fruit, as assets.

Naturally, however, situations arise where after the initial 'opening up' of the mine was complete, new unexpected opportunities presented themselves, e.g. it became appropriate to sink a second main shaft. Debt capital was expensive and not readily available and existing shareholders (including the directors) having made a successful 'strike' were loath to dilute their prospects by further issues of equity. In the turbulent mining share market operators of genuinely successful mines were not always confident that they could credibly signal the value of their companies. A successful issue of further shares would probably also entail a lengthy and arduous trip to Europe by one of the directors. It is therefore not surprising that these questions were generally funded by retentions of profits.

In line with the prudent approach of treating expenditure on mining assets as irretrievable and sunk, i.e. showing it in the top half of the balance sheet, it was necessary to appropriate, to a non-distributable reserve, amounts equal to the value of major expansions. In summary, original mining assets were not depreciated and subsequent minor 'capital expenditure' was charged as an expense, but major expansions were appropriated from profits in full before dividends could be declared, thereby prudently protecting creditors.

At the same time directors sought to comfort shareholders with assurances that all profits were being paid out as dividends. There are only four ways in which this can be achieved:

1. Restricting cash outflows to operating expenses, i.e. not incurring capital expenditure;
2. Matching capital expenditure exactly with depreciation charges against profits;
3. Matching capital expenditure with borrowed cash or new share proceeds;
4. Defining profits to be what is arrived at after writing off capital expenditure against profits.

Option 1 was not feasible, since incremental organic expansions of the mine inevitably arose, option 2 could not be relied upon if depreciation was to follow a rational pattern and option 3 was, as explained above, unattractive. Only option 4 remained and it was duly adopted.

5.3. Periodicity and matching

At this time gold mines were not expected to last very long. At first there was a view that they were merely exploiting isolated outcrops. This idea persisted, because of the way the industry became organised, even after it became clear that the Transvaal gold was not in isolated outcrops but in consistent reefs. If, for example, the Robinson group made a new strike 10 miles distant, they would not incorporate the operations within an ex-

isting company but float a new company selling off a high proportion of the shares thereby tapping new capital and spreading some of the high risk.

Evidence of the attitude that mines were finite-life operations comes from the analogies drawn by Bogle (1889) with 'single ship' companies, from the contemporary press reports and from directors' reports. Until about 1910 the opening up, exploitation and abandonment of a claim were understandably seen as a single transaction. 'The working out of claims by a company is a single transaction, and must be viewed as a whole: consequently until all moneys each investor has put into the company have been repaid, such individual investor has not received any profit' (Pim 1898: 930). Particularly persuasive are the cumulative statements of receipt and expenditure in periodic reports to shareholders. For example, the Directors' Report of Crown Reef for year to 31 March 1905 included the summary of cumulative receipts and expenditure from formation in 1888 to 1905 shown in Figure 3.

The publication of this cumulative account supports the limited life view of the mining enterprise and suggests that the 12 month account period was not especially relevant. This being the case, the concept of *matching* was less important.

5.4. Capital maintenance

The cumulative receipts and expenditure account also emphasises the central importance that was placed on the stewardship role of directors— it shows clearly what money they were accountable for, what they had done with it and the extent to which shareholders had recovered, in the form of dividends, the capital they had subscribed.

The prominence given to this account in each annual (and six monthly) report, the fact that it is cumulative, and the way in which share sales are not separated from other receipts supports the view that neither the maintenance of financial capital nor of physical capital was important.

'There is no necessity (for a mining company) to make that accurate distinction between capital and revenue which is so important in the case of all concerns that are expected to be worked for an indefinite period. As it is impossible to say with absolute accuracy in such cases what the real net profits are, it is very much better to frankly admit the fact, and to pay dividends for what they are worth—without attempting to estimate the exact amount which it would be necessary to set aside in respect of depreciation.' The Accountant, July 7 1898: 686.

The wasting nature of investments in operating mines is explicitly referred to in the Transvaal So-

Figure 3
Extract from Directors' Report of Crown Reef summarising receipts and expenditures 1888-1905

Receipts

Share sales: at commencement	14,000
sale of reserve shares	148,187
Sale of gold and other minerals	5,335,849
Sundry revenue	39,941
	5,537,978

Expenditure

Working expenditure including depreciation and development write-off	3,276,408
Surface improvements	185,047
Mine development incurred before write-off policy started	24,261
Net current assets	69,690
Reserve fund	152,670
Dividends	1,829,900
	5,537,978

ciety's recommended accounting policy. That it was fully recognised in earlier times is shown by Lindley's judgment in *Lee v. Neuchatel*, by the writings of Pim, e.g. 1898, and in the professional journals.[32]

Given the restriction placed on the operations of individual mining companies by the extent of their claims, and because the industry structure did not encourage operating companies to perpetuate themselves by buying further claims, there seemed little point in companies withholding cash surpluses until the end of the mine's life. 'The individual stockholder...would prefer to have his capital returned to him as fast as it may be taken from the mine, rather than await the accumulation of a fund sufficient to redeem the whole capital.' (Jenkins, 1902: 707). Since the enterprises tended to be viewed as relatively short-term vehicles for speculation[33] there was little imperative to maintain capital. The logic of this approach was supported in 1979 by Chambers:

> 'It makes no sense in the case of a mining company to speak of replacing a mine. A company may seek to stay in the mining business to exploit its expertise; but there is no commercial principle by reason of which its shareholders or its present customers can

[32] '[W]hen shareholders invest money in a mining company they should look upon it as being spent for the purposes of developing the mine, and when they have received the net profits, in the way of dividends, they should apportion them between capital and income, for when the mine has been worked out and the plant sold for a small sum, usually it will be found that the return of capital is very small.' Casselton Elliot, 1912: 252.

[33] 'It is undesirable that, when persons invest in so highly speculative an undertaking as a gold mine, they be in any way deluded into the impression that what they have got is an investment rather than a speculation.' *The Accountant*, July 7 1898: 687.

be obliged to finance such additional ventures' (p12).

5.5. Summary of conceptual issues

What we see then, is a set of circumstances combining to draw forth unusual accounting policies. It cannot be said that they were optimal, but the fact that they became established and persisted for many years does imply that they had some merit.

The AM was imprudent in allowing companies to pay out dividends beyond the extent to which the value of the company had increased. At the end of a mine's life it resulted in a balance sheet with share capital and a non-distributable reserve represented only by worthless mining assets still carried at their undepreciated original cost. On the other hand it *was* prudent in that it clearly signalled from the start, and through the life of the mine, that investments in mining assets were sunk. If after two years the ores ran out, real capital would not have been maintained whether or not depreciation had been provided. In 1909 *The Accountant* included an anonymous article (February 13: 220) which stated 'there is little to be gained by laboriously attempting to distinguish between revenue and capital; for even if the former only be distributed, there will remain not the least gurantee that the latter is intact, and can be returned in full when the mine is closed down.' It was also prudent in that expansions, even if funded by debt, were covered by capital reserves explicitly appropriated for that purpose and thereby limiting dividends. Finally, because after the original shaft-sinking only major expansions were capitalised, directors were prevented from masking operating deficits by capitalising spurious expenditure.

Matching was a casualty of the AM because over any particular year profits were overstated,

since they were not matched with a share of the cost of the mining assets. This shortcoming was mitigated by the understanding that the enterprise was a single transaction over a limited time period and, due to the problems of rationally allocating costs into 12 month periods, revenues and costs could only be matched over the mine's entire life.

The AM therefore, does not purport to comply with the matching principle or to **maintain capital** and it complemented conventional **periodicity** with cumulative accounts of income and expenditure. It also interprets prudence in an unusual though pragmatic way.

5.6. The process of transition

It is difficult to identify a date from which the AM became firmly established. The Crown Reef directors' report makes it clear that depreciation of specialised mining assets ceased in 1899 but the fact that various authors were advocating this approach for several years afterwards suggests that not all companies changed at the same time. In 1902 Jenkins wrote (p.705) that some mining companies were depreciating and some were not and that 'the questions of distinguishing between capital and revenue for sums expended in the original purchase, enlargements, and improvements is a matter of individual concern and choice'.

In 1912 Tait, of the South African staff of a leading group of mines, in his *Gold Mine Accounts and Costing* (1912: 63), stated that once crushing is commenced the Development Account should be closed and further development 'is generally charged direct to working costs'. However the method was not then fully in place, since Tait suggested that working expenditure should include a Development Redemption charge.

The first clear articulation of what became known as the AM, of which we are aware, was in 1912:

> 'Some of the gold mining companies on the Rand do not write off any depreciation at all on the initial capital expenditure, and all repairs and renewals are charged to revenue; any capital expenditure incurred after the production stage has been reached is, however, provided for out of profits by transferring from appropriation of profits accounts a sufficient sum to the credit of an account entitled "Revenue appropriated for capital expenditure in excess of working capital provided" and this takes the place of an ordinary depreciation reserve account. By this means the capital provided by the shareholders is not preserved intact, but all available cash is distributed as dividends.'[34]

In 1914 a report by the Mine Accounts and Cost Sheets Committee of the London-based Institution of Mining and Metallurgy included the following sentences:

> 'Auditors abroad...do not always insist on depreciation of machinery and plant, buildings etc. Other methods are to...appropriate each year a certain proportion of the profits to a special reserve fund.'[35]

There is no doubt that by 1930 the AM had become entrenched in South Africa:

> 'In the balance sheet a semi-double account system is used whereby the capital expenditure is shown at original cost, and capital raised...as a contra...When the whole of the capital has been expended and further capital expenditure is incurred...the necessary funds can be provided only out of profits, and in order to balance the capital assets and liabilities, it is necessary to appropriate profits, year by year, to the exact extent of capital expenditure incurred....gold mining companies make no charge against profits for depreciation....All the gold mining companies on the Witwatersrand have adopted this procedure.' (Dix, 1932: 843–4)

6. Conclusion

The Appropriation Method has been used by South African mining companies for many years and continues to have local industry support.

When the adoption of the method is looked at with an understanding of local conditions and in a proper historical context, it can be seen to be well considered and suitable for the needs of users in that industry. It did not 'just happen' and certainly did not happen neatly or all at once. As shown by Morris (1986), the *Lee v. Neuchatel* decision of 1889 retarded the rate of adoption of depreciation accounting among British mining companies; for South Africa, the case came at a critical time just as the new gold mining companies were establishing their accounting policies. The method evolved organically, and at times in a muddled fashion, but it clearly is the result of considerable thought and refinement over the years 1885 to 1912. Its persistence is a reminder that while assumptions of uniform accounting periods, matching, business continuity and the need for capital maintenance underpin most conventional accounting, nevertheless useful accountings can exist, and possibly be superior in particular circumstances, without these assumptions. Indeed, as argued by Brief (1983: 28–29), matching is not unam-

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[34] Casselton Elliot, *The Incorporated Accountants' Journal.* June 1912: 250.

[35] *Transactions of the Institution of Mining and Metallurgy*, 1914: 550–551.

biguously related either to the calculation of an enterprise's total income to the end of its life, or to the events that have occurred during a single interim period for which a cash receipts less disbursements approach can be more effective.

This paper has attempted to describe the ways in which unusual accounting policies emerged and became established in response to specialised circumstances. In formalising these policies the mining accountants confronted fundamental accounting principles and arrived at interpretations different from those in other industries and other countries.

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Mattessich's Critique of Accounting: a review article

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Abstract—Mattessich's *Critique of Accounting* sums up and brings together his work over four decades in accounting theory, though with most emphasis on the period since 1970. Its publication is a significant event which constitutes a serious claim for him to be ranked among the pre-eminent accounting thinkers of this half-century. This essay does not attempt directly to evaluate that claim, but focuses on reviewing the book in some detail. One may (and, as this paper argues, should) recognise and value Mattessich's contributions as an accounting thinker without necessarily agreeing with all or even most of his philosophical positions. The paper takes the position that, for the purpose of a *Critique of Accounting*, a more fruitful development of his ontological and epistemological positions (following his publication of *Instrumental Reasoning and Systems Methodology* (Mattessich, 1978)) would have lain in the direction of the philosophy of social science—or more generally, of post-positivist and post-empiricist approaches in epistemology. These are perspectives from which Mattessich's Conditional-Normative Accounting Methodology (CoNAM), and his philosophical position as a whole, confront a number of important questions that are examined in this paper. Because of Mattessich's standing as an accounting thinker, and his book's focus on fundamental issues in accounting thought, it deserves to be considered as essential reading for all those interested in such issues.

1. Introduction

1.1. Mattessich's significance as an accounting theorist

This paper is an evaluation of much of Mattessich's work as an accounting theorist. Without anticipating the paper's conclusions, it may be useful to start by giving some indication of what I consider to be his work's significance.

A number of classic works in accounting theory were published in the 1960s, before the more empirical preoccupations of the 1970s and subsequent decades. These classics include Edwards and Bell (1961), Chambers (1966), Ijiri (1967), as well as Mattessich (1964), the last three of which have been reprinted by the Scholars' Book Company in their Accounting Classics series. Mattessich's 1966 book, *Accounting and Analytical Methods* (AAM), shared with the others a concern for identifying a basic theoretical structure for accounting.

But in some respects it was unlike other accounting theory books. The remarkable opening paragraph of the book displays a keen awareness both of the *instrumentality* of accounting and of its *epistemological* and *methodological* problems stemming from its apparent reliance on received ideas or dogmas. In an equally remarkable passage in the concluding chapter, Mattessich compared

accounting to the Russian General Kutuzov as portrayed in Tolstoy's *War and Peace*. Notwithstanding its epistemological and methodological problems (paralleling Kutuzov's inability to defeat Napoleon), accounting manages to 'provide a mighty bulwark against chaos' for us in our economic dealings, as Kutuzov did for the Russian people in its struggle against Napoleon.

Mattessich's major academic project has been to put forward a basis for improving the capacity (epistemological and above all methodological) of accounting to achieve its instrumental aims. This project has found its culmination in his *conditional-normative accounting methodology* (Mattessich, 1995a). In this connection, it is surely relevant that Mattessich trained as an engineer before converting first to business administration and economics (in the German–Austrian tradition) and then to accounting (Mattessich, 1995c). Mattessich wants accounting artefacts to have an instrumentality, analogous to that of engineering artefacts.

At the same time, in spite of long residence in North America, his Austrian origins and culture have continued to influence his work. Vienna, where Mattessich undertook his postgraduate studies, is the city of Ludwig Wittgenstein (before his move to Cambridge) as well as of Rudolf Carnap and his philosophical associates in the Vienna Circle of the 1920s and 1930s; Mattessich's abiding concern with philosophical foundations continues that tradition. (As it happened, Ludwig Wittgenstein also trained as an engineer, before turning to philosophy.)

Consequently, Mattessich's reactions to the 'empirical turn' in accounting since the late 1960s,

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and to the development of 'positive accounting theory', are of particular interest. It is not necessary to agree with Mattessich in order to find his approach to fundamental issues in accounting theory highly instructive. This paper is written in that spirit.[1]

1.2. The book Critique of Accounting

Critique of Accounting: Examination of the Foundations and Normative Structure of an Applied Discipline is intended primarily as a synthesis of Mattessich's work in accounting theory during the period since 1970. As Mattessich tells us in his introduction, the word 'critique' in the title of his book is to be understood in the sense of the German *Kritik*, namely critical examination or evaluation (c.f. Kant's *Critiques of Pure and Practical Reason*), with particular reference to 'the extent to which a discipline can represent the pertinent reality'.

The reference to 'pertinent reality' suggests that Mattessich places ontological issues, concerning the reality to which accounting concepts may arguably refer, in the forefront of his concerns. In fact, he gives at least equal emphasis to the epistemological issues of how we acquire knowledge of reality, and methodological issues of how the validity of claims to knowledge may be evaluated.

In addition, Mattessich places particular insistence on certain teleological issues regarding the purposes of different bodies of knowledge and their methodological implications, especially the distinction between 'pure' and 'applied' disciplines. Mattessich's ideas (explicit and implicit) concerning the relationship between the purposive aspects of accounting and the criteria for accepting accounting prescriptions as valid, within CoNAM, will receive particular attention in this review article.

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[1] As well as the two helpful referees' reports on an earlier version of this paper, I received from Professor Mattessich, to whom I had sent a copy of the same version, nine pages of valuable comments (Mattessich, 1998). Some of these comments made it clear that the text of his book could and should be understood differently from the way I had originally done so, and I have revised the paper accordingly. Other comments served to clarify his position in ways that were less directly related to my understanding of the text of the book. I believe I owe it to the reader, as well as to Mattessich, to indicate the thrust of these comments, either in the text or in footnotes, so far as the limitations of length in an already long paper allowed. I note here, at the outset, Mattessich's remark that in his view my evaluation of his work is made largely from the standpoint of what he terms the Critical–Interpretive (CI) school (see Mattessich, 1995b ch.10), and that I tend to criticise him, in essence, for not belonging to that school. As my background is in analytical rather than critical philosophy (except maybe in the Kantian sense of 'critical'), and I am not sure to what extent the colleagues whom Mattessich (following Chua, 1986) classifies as belonging to the CI school would recognise me as one of their number, I shall leave that judgment to the reader!

The remainder of this paper is structured as follows: Section 2 provides an overview of the book, including brief summaries of chapters 4, 5 and 6. Section 3 discusses Mattessich's ontological ideas, set out in chapter 3 of the book. Section 4 examines his epistemological arguments in chapters 7 and 8 as well as his critique of Positive Accounting Theory in chapter 9. Section 5 considers CoNAM as set out in his chapter 11, together with his views on 'normative accounting' in chapter 10. Finally, Section 6 provides some concluding remarks.

2. Overview of the book

2.1. Mattessich's introduction

As well as explaining what he means by 'critique', Mattessich discusses the notion that accounting is in, or approaching, a state of crisis (e.g. Belkaoui, 1989). He agrees that there is a crisis in accounting, the crisis having three main components: (a) legislative and social; (b) moral or spiritual; and (c) academic.

The first component is reflected in issues of corporate governance and related questions of auditor independence; namely, the deficiencies of accounting in the enforcement of accountability. The second is related to what Mattessich and others perceive to be a decline in business ethics during recent decades, and the concomitant neglect of ethical issues in accounting thought. The third component is as identified by Demski et al. (1991), but Mattessich particularly emphasises the neglect of accountability issues in research as a result of the priority accorded to issues of valuation and decision usefulness, as well as the 'schism' between the *Weltanschauung* of the 'positive' accounting researchers and that of practitioners.

This latter problem is attributed by Mattessich to 'the attempt to convert a basically applied discipline into a *positive* science' (p. 9, emphasis in original). For him, 'the recognition of accounting as an applied science...[p]erhaps...is the pivot on which a resolution to the present crisis hinges' (p. 10). This recognition has, for him, major methodological implications which are discussed in Sections 4 and 5 below. In this paper, as in the book, the emphasis is on this third component of the 'crisis'.

I should note at this point that Mattessich and I use the terms 'positive', 'positivism' and 'normative' differently (and, indeed, the terms are used with various meanings in the literatures of philosophy and accounting). For me, positivism is belief in the fact-value dichotomy, namely that there can be *value-free knowledge*; 'positive' when used in such contexts means 'value-free'. Mattessich (p. 161) acknowledges that '[t]he scientific and philosophic meaning of *positive* implies a theory free of value judgements (except for pre-scientific ones

...)'.[2] However, in general he uses the term differently, as discussed below.

Auguste Comte, the originator of this terminology, used the term 'positive' to mean 'free from supernatural or metaphysical speculation'. Comte's view of the natural science of his times was that it was 'positive' in this sense, and he proposed a similarly 'positive' social science. However, Comte also held that 'any proposition that is not strictly reducible to the *simple enumeration of the fact*—either particular or general—can have no real or intelligible meaning for us'. (Comte, 1844, quoted by Keat and Urry, 1982: 73; emphasis added). This is the fact-value dichotomy to which I refer above.

Mattessich generally uses the term 'positive' to refer to pure, i.e. non-prescriptive, science. He also uses the term 'normative' to mean 'prescriptive' when he speaks of applied science, whereas I prefer to distinguish 'prescriptive' from 'normative' and reserve the latter to mean 'value-laden', i.e. not value-free.

2.2. The historical origins of accounting and their ontological and epistemological implications

As he indicates in chapter 2 of the book, the discovery by the archaeologist Denise Schmandt-Besserat of the use of clay artefacts for accounting purposes in Mesopotamia towards the end of the third millennium B.C. fascinated Mattessich. He saw these artefacts as being used to represent not just physical reality (e.g. numbers of different types of livestock) but also social reality in the form of debtor-creditor relations and ownership claims. The development of accounting systems led to that of primitive forms of writing, and can thus be seen as part of a more general development of conceptual representation; namely the development of counting and the representation by physical symbols (tokens, writing) not merely of physical objects but of sets of objects and also of social relations.

In the same chapter, Mattessich also discusses the contributions to society of accounting in classical and medieval times, but it is the role of accounting in representing social reality that is a major theme in the book, being further developed in chapter 3.

2.3. Social reality and accounting representation

In chapter 3, Mattessich takes issue with a view expressed by a number of accounting thinkers that accounting concepts such as income do not represent any empirical reality. He cites Loyd C.

Heath and Robert R. Sterling as representatives of this view, but oddly does not refer anywhere to Arthur L. Thomas, whose two monographs on 'The Allocation Problem' (Thomas, 1969 and 1974) provide its most sustained and eloquent expression. As Mattessich's ideas on ontology are analysed at some length in Section 3, they will not be discussed further here.

2.4. Conceptual foundations of accounting

Chapter 4 sets out Mattessich's views on the development of accounting as an 'applied science', with particular reference to the more recent decades, which he sees as a transitional period characterised by 'a change in spirit and the application of new techniques as well as new insights borrowed from other disciplines. This transition period I regard as the adolescence of accounting...marked by experimentation, restlessness, a bent for extremes, and what seems to be a continuing state of crisis...connecting the childhood years of our discipline...with the adult period yet to come' (pp. 60–61).

He cites a number of methodological obstacles standing in the way of such a development, and in particular the failure to make the following distinctions: (a) between primitive (or borrowed) terms and terms derived from these by means of nominal definitions within accounting theory; and (b) between uninterpreted and interpreted concepts (e.g. between the general notion of 'asset values' within an accounting structure and specific asset valuation bases). Mattessich refers to the role of classification and the construction of taxonomies of uninterpreted (generic) accounting concepts[3], as well as rules for arriving at their various specific interpretations or subconcepts. He comments that 'the "Linnaeus" of accounting thought has not yet appeared....The hurdle is the apparent subjectivity of many accounting concepts' (p. 70).

I wish to expand Mattessich's reasoning on this latter point. It seems to me that there are two hurdles. On the one hand, there is the incomplete state of the theoretical structure within which the generic, uninterpreted concepts would play the key role mentioned by Mattessich; an incompleteness which the Conceptual Framework (CF) project of the FASB largely failed to make good (an exception being the taxonomic model of comprehensive income). On the other hand, there is a more fundamental stumbling-block; namely, that subjectivity is a problem because the choice of specific interpretations of accounting concepts is made in the absence of adequate knowledge of means-end relationships capable of providing objective crite-

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[2] Some of the above has become apparent from private correspondence with Mattessich (Mattessich, 1998). As to the matter of 'pre-scientific value-judgements', see the discussion and the quotation from Ravetz (1971) in subsection 4.1. below.

[3] One could cite the taxonomic model of 'comprehensive income' in SFAC 3 (Financial Accounting Standards Board, 1980), but Mattessich does not do so.

ria (conditional on the end pursued) for such choices. The extent to which this latter problem might be an obstacle for CoNAM will be discussed in Section 5 below.

What the 'adult period' mentioned by Mattessich would be like cannot of course be indicated in advance. As he puts it: 'As long as such understanding eludes us, accountants must do what chemists did before the periodic table could be explained in terms of subatomic particles. They must construct self-contained theories on the basis of what they know. Then slowly, step by step (with the progress of their own discipline as well as that of the more basic disciplines in which accounting is embedded), one might be able to extend [accounting theory...by drawing] on the foundations of [sociology, psychology and economics] as worked out by their own experts. Only then may accountants borrow them and try to add their own modest contributions to these parental disciplines' (p. 74).

The passage just cited, stressing the epistemological relationship between accounting and the 'parental' disciplines of the social and behavioural sciences, illustrates very well an important aspect of Mattessich's stance on accounting epistemology, an aspect with which I am in full agreement (Archer, 1993). However, the analogy with 19th century chemistry may be misleading, and this will be discussed further in Section 5.

2.5. Formalisation, information and valuation models

This subsection covers chapters 5 and 6 of *Critique of Accounting*. Chapter 5 provides a much needed link between Mattessich's earlier work, and especially the axiomatic approach set out in *Accounting and Analytical Methods* (1964), further elaborated in the German version *Die Wissenschaftlichen Grundlagen des Rechnungswesens* (1970), and his subsequent development of CoNAM. A crucial element here is his assumption, numbered A-12 within his set of 21 basic assumptions, that 'there is some specific purpose and information objective to be attained by a particular accounting system' (p. 85).

The preoccupation with 'general purpose financial statements' which characterised the FASB's Conceptual Framework project might be considered to be a violation of Mattessich's Assumption A-12. If so, the fact that this preoccupation raises a conceptual difficulty suggests that the assumption is valid. The conceptual difficulty is this: the notion of general purpose financial statements is intrinsically problematic from an informational perspective, since the distinction between information and mere data is that the former is intended to meet some known decision-making needs, while the latter are not; hence, strictly speaking, general

purpose financial statements could serve only as data, not as information (Most, 1982: 160–162; Archer, 1993: 76–77).[4]

One of the important themes evoked in chapter 4 is reiterated in chapter 5, when Mattessich states: 'The formulation of hypotheses for specific accounting objectives (means-end relations) through behavioral and other empirical research might be one of the major tasks faced by future accountants. For now, there are no satisfactory answers to [a number of crucial] questions [including]... above all, which [of the different interpretations of value, income, and realisation] matches which information purpose....The cathartic task of this transition period would lie in converting rules of thumb into well-grounded objective-oriented hypotheses' (p. 87).

Mattessich comments that for various reasons[5] there was a shift during the 1970s away from the search for a rigorously formulated general theory of accounting towards information economics and related areas, which he briefly reviews. But he concludes by pointing out that 'the notion of information is by no means limited to economics' (p. 92), a criticism developed further in his critique of Positive Accounting Theory (PAT) in chapter 9.

Chapter 6 not merely reviews various approaches to accounting for changing prices, it also uses them as an illustration of CoNAM; that is, of how accounting can provide *means* in the form of combinations of valuation models and capital maintenance benchmarks which (he argues) can meet particular *ends* of accounting. Yet, as noted above, in the preceding chapter Mattessich remarked: 'For now, there are no satisfactory answers to [the question of] which [of the different interpretations of value, income, and realisation] matches which information purpose.' This suggests that there are perhaps more substantial difficulties in the path of CoNAM than he at other times seems to recognise; a point that will be further considered in Section 5 below.

2.6. Accounting from the perspective of philosophy and history of science

Mattessich devotes chapter 7 of *Critique of Accounting* to an exposition of developments in 'post-Kuhnian' philosophy of science during the 1970s and 1980s. This chapter contains some important ontological and epistemological discussions. Chap-

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[4] Mattessich's view (pp. 79–80) of the FASB's CF project is that it was largely a wasted opportunity. See also footnote 5.

[5] He remarks (p.88) that 'two factors were decisive [in preventing] the academic search for a general theory of accounting [from continuing perhaps towards eventual success]: (1) the advent of positive accounting theory ...; and (2) the failure of professional accounting bodies and the FASB to employ rigorous analytical means in developing a conceptual framework of accounting'.

ter 8 is devoted to an application of Kuhn's (1962) concept of 'paradigms' and Lakatos' (1970) arguably analogous concept of 'research programmes' to accounting research. Chapter 9 is a critique of PAT. The subject-matter of these chapters will be discussed at some length in Sections 3 and 4 below. I will therefore raise just two points here.

The first concerns the extent to which Mattessich's analysis in chapter 8 is primarily historical rather than epistemological. Only in the last three pages of the chapter are philosophical considerations explicitly evoked. He argues (p. 156) that: (a) 'accounting, like many other scientific endeavours, consists of different research traditions that compete with and complement each other'; and (b) 'each research tradition constitutes an entire network of theory elements...[which] compete with each other as well, but in a more moderate or secondary fashion'. He envisages a more rigorous and formal analysis of network structures in accounting research programmes which 'could further improve upon the search for an appropriate axiomatization of accounting theory by revealing its logical structure as well as its empirical claims in a clearer and more generally acceptable way than [hitherto]'. This appears to be somewhat vague and inconclusive.

The second point relates to Mattessich's stance on positivism. He states that his critique of PAT in chapter 9 is concerned not so much to cast doubt on the value of the empirical research studies normally associated with it but rather to object to the methodological (and epistemological) assumptions made by proponents of the view that accounting is or should be a 'positive' (i.e. non-prescriptive) body of knowledge.[6] Whether he rejects positivism generally, or only in relation to applied disciplines such as accounting (that is, in 'instrumental reasoning'), or perhaps more generally in relation to the domains of the social sciences, is not clear at this point. In the initial pages of chapter 9 (p. 162), he remarks: 'If accounting is an applied discipline,...then the term positive has no place in it, except when referring to the pure mother disciplines of economics and the behavioural sciences on which accounting rests'. But by 'positive', Mattessich merely means 'non-prescriptive', so that for him the terms 'pure science' and 'positive science' are synonymous. He is not using 'positive' in the sense of 'value-free', and would refuse to be classified as a 'positivist' in the sense of a believer in value-free science.[7]

In other words, one would be mistaken in taking the passage quoted above as indicating that Mattessich believes that the 'pure mother disciplines'

of economics and the behavioural sciences are value-free.

2.7. Normative accounting theories and CoNAM

In chapter 10, Mattessich starts by making a distinction between ethical-normative and pragmatic-normative approaches. Interesting though it is, this distinction would benefit from some clarification beyond that provided by Mattessich, who remarks (p. 185n) that '[t]he major characteristic of the ethical-normative direction is its explicit commitment to a social equity (e.g. environmental, consumer, income and wealth distributional concerns) beyond the individual or merely economic principles, while the pragmatic normative direction relies on (implicit or explicit) value judgements, constituting methodological, technical, legal or administrative norms'.

It would seem that for the ethical-normative thinkers, their normative approach to accounting was related to a more general normative standpoint on business economics and business ethics, which is inclined to be critical of conventional managerialist assumptions such as the goal of maximising the wealth of capital-owners. As well as the German ethical-normative theorists cited by Mattessich, one might perhaps include the Dutchman Theodore Limperg among such thinkers (see Mey, 1966).

By contrast, the pragmatic-normative theorists are concerned with the ability of accounting to meet assumed objectives such as 'stewardship' on one hand or 'decision-usefulness' on the other, without relating their ideas to more general considerations of business ethics or, except in a loose sense regarding decision-usefulness, to economics.

Mattessich chides Hendriksen (1982) for failing to recognise this difference, and also for not appreciating the distinctiveness of the conditional-normative approach. Indeed, the term 'normative' is used rather loosely in the accounting literature; as Mattessich notes, for many writers it seems to be synonymous (or at least co-extensive) with 'deductive'. Philosophers typically use it to mean 'value-laden' as opposed to 'value-free', whereas writers on accounting often use it to mean 'prescriptive' as opposed to 'descriptive' or 'predictive'. In his *Instrumental Reasoning and Systems Methodology* (1978), Mattessich explains clearly the relation between prediction and prescription. His treatment of this in *Critique of Accounting* is more succinct and also less clear.

Because of this lack of clarity of the term 'normative' as used in the accounting literature, Mattessich's choice of the name 'conditional-normative accounting methodology' is perhaps less than ideal. The term 'normative' is intended to indicate Mattessich's rejection of 'positivism' (in the sense of non-prescriptivity) in instrumental reasoning; in

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[6] See the discussion of Mattessich's use of the terms 'positive' and 'normative' in subsection 2.1 above.

[7] This was clarified by him in private correspondence (Mattessich, 1998).

fact, the essence of CoNAM is that it is conditional-*prescriptive*, in the sense that the applicability of the prescriptions (as in medicine, engineering and the applied sciences generally) is conditional on the ends being sought.

2.8. Mattessich's summary and conclusion

The place to evaluate Mattessich's overall theoretical position will be in the conclusion of this paper. However, it may be useful to draw attention here to what he presents as the three 'major methodological insights to be gleaned' from his book:

'(1) There is a fundamental difference between ...the economics (and sociology) of accounting... and accounting as an applied science; (2) Economics of accounting alone cannot explain the rationality of accounting practice. To elucidate the gap between the positive representation and the pragmatic representation of economic transactions requires an analysis of the pertinent value judgments and means-end relations that are sandwiched between these two modes of representation; (3) To find a solution to the dilemma of academic accounting, the hierarchy of accounting objectives must be clarified; norms must be incorporated as conditional premises into accounting models and theories; and means-end relations must be formulated and empirically tested—not unlike ordinary cause-and-effect relations being tested in the pure sciences.' (p. 222).

The 'fundamental difference' mentioned first is the methodological difference between pure and applied sciences; but there is also the question, which will be raised in Section 4 and discussed in Section 5, of whether this implies an epistemological difference also. With regard to the second proposition, it is important to recall that Mattessich is using 'positive' to mean 'non-prescriptive' and not 'value-free'. He is not implying the possibility of any 'positive' (i.e. value-free) representation of economic transactions, and indeed shares Putnam's (1981) rejection of the rigid, positivistic fact-value dichotomy (see subsection 4.1. below).[8] Perhaps the key issue here concerns the cost-effectiveness and cost-benefit aspects of accounting representations; but it is not evident how these can be judged in the absence of adequate knowledge of means-end relations. The need to develop such knowledge is, indeed, stated in the third proposition; Mattessich comments that this will require 'another empirical revolution'.

However, with regard to the 'clarification of the hierarchy of accounting objectives', he here seems to overlook something of which he at other times shows awareness; namely, the extent to which 'the hierarchy of accounting objectives' involves polit-

ical and ideological issues, including conflicts of objectives, which may inhibit the clear and unambiguous statement of such objectives.

Two key issues regarding the potential contribution of CoNAM to accounting thought are, therefore: first, its relationship with the empirical breakthroughs that are needed to bring knowledge of means-end relations to an adequate level; and second, its manner of dealing with the problem of accounting objectives. On the first point, a clarification of the objectives of accounting would arguably provide a crucial additional focus for empirical studies. On the latter point, Mattessich acknowledges in chapter 9 that 'at least to some extent, the "accounting crisis" is rooted in frequent attempts to conceal the true objectives pursued. If a conditional-normative methodology of accounting can prevent such hypocrisy and concealment, this in itself would be a strong argument [for] such an approach' (p. 168). However, it is not clear how CoNAM might indeed 'prevent such hypocrisy and concealment' and thus be in a position to contribute to the empirical breakthrough, unless it is implied that the advent of CoNAM would be accompanied by a new willingness of people to disclose 'hidden agendas'.

3. Mattessich's ontological ideas

In the opening section of his chapter 3, Mattessich sets out 'three simple perquisites crucial for an understanding of this chapter':

'A clear distinction between empirical phenomena and the concepts by means of which accountants represent them;
An awareness that some concepts are empirically empty and the need for a keen eye to distinguish those that are not backed by phenomena from those that are;
An admission that empirical reality is not confined to physical phenomena but engulfs a hierarchy that includes social, psychological and other phenomena as well.'

This 'hierarchy' is what Mattessich sometimes refers to as the 'onion model of reality' (e.g. pp. 44–45). He then proceeds to refute the ontological position adopted by a number of accounting thinkers that (to quote two of his antagonists) 'income does not exist in the real world....stockholders' equity is simply a name' (Heath, 1987), and 'there are no phenomena that correspond to most of the numerals that appear on financial statements' (Sterling, 1988).

Curiously, Mattessich nowhere refers to the writer who first (and perhaps most eloquently) expressed such objections to accounting concepts, namely Thomas (1969, 1974), whose critique of conventional accounting focussed on what he termed 'the allocation problem'. Thomas con-

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[8] This point was clarified in private correspondence (Mattessich, 1998).

sidered allocations such as those used in accounting for fixed assets or inventories as 'irredeemably arbitrary' and referred to allocation-laden accounting constructs, including net income, as 'the furniture of accountants' minds', i.e. failing to denote anything empirical (Thomas, 1974).[9]

The ontological position adopted by all these writers is (a seemingly naïve form of) *external realism*, coupled with epistemological *positivism*. From such a perspective, concepts such as net income and stockholders' equity are indeed problematic since they do not appear to denote any objective, external reality. Moreover, the rules used to arrive at the numbers reported under these concepts are a matter of pragmatic convention and lack scientific foundation; in addition, because of what Ijiri (1975) termed 'measurement slack', their very application is subject to bias on the accountant's part. The numbers are thus value-laden and hence objectionable as 'factual representations' from a positivist perspective which insists upon a strict dichotomy between fact and value.

Mattessich makes short shrift of the positivistic external realist objection to accounting concepts, by arguing convincingly that the relevant reality is social rather than just physical.[10] Thus, stockholders' equity represents a (socially real) ownership claim, and net income represents an increment in that ownership claim. Exchange value, as used in accounting, is an 'emergent property' (in a systems-theoretic sense) behind which 'stands a social reality as soon as one transgresses from the psychic level of preferences (a psychic reality) into the economic area of money and potential exchange' (p. 51). Mattessich also points out that cost-effectiveness is highly relevant in judging the adequacy of accounting measures, which are generally used not for scientific purposes but to meet practical social needs.

There is, however, a further set of issues which Mattessich does not really address in this chapter, namely those associated with what Sunder (1997: 79) terms 'the reflexive relationship between accounting and its environment'. Under accounting concepts, numbers are arrived at using rules which are a matter of social convention agreed through recognised social institutions (legal or extra-legal). Mattessich refers to a social level of reality, to which the referents of accounting concepts belong; the term 'economic reality' is commonly used in the accounting literature. But what are the ontological as well as the epistemological implications of the fact that accounting measures constructed using conventionally-agreed rules have real social consequences? Notwithstanding his rejection of the positivistic external realist critique of accounting concepts articulated by writers such as Thomas, Sterling and Heath, it is not clear from Mattessich's chapter 3 whether for him accounting representations passively reflect socio-economic reality; or whether, as for Ijiri (1975) and Hines (1988), accounting is actively implicated in its intersubjective construction and reproduction.

In order to clarify Mattessich's position on this key ontological issue, his epistemological ideas, as set out in his chapters 7, 8 and 9, may provide some guidance. It is to these that we now turn.

4. Mattessich's epistemology and critique of 'positive accounting theory'

4.1. Mattessich's epistemology and its ontological implications

Ever since Immanuel Kant responded to David Hume's sceptical challenge with his *Critique of Pure Reason* (*Kritik der Reinen Vernunft*, 1787), the relationship between reality and mind (the interaction between epistemology and ontology) has been a central issue in philosophy, as it had been for Plato. In what sense can reality be said to exist independently of mind, or of *representations* made by minds (Searle, 1995: 152)?

According to the Idealist position of Hume, there is no logical basis for believing in the existence of anything but perceptions. Kant was able to show that there must exist some basis or substrate for our experience, 'an unknown and unknowable X which "affects" our senses' (Körner, 1955: 91); while our human cognitive apparatus permits us to experience and represent these effects on our senses as a shared 'reality-for-us'. According to this view, therefore, reality as we experience it is an intersubjective construction: a position echoed in contemporary philosophy and sociology of knowledge; see, for example, Putnam (1981) and Berger and Luckmann (1966). Putnam (1981 ch. 3) terms this position 'internal realism'.

Tennant (1987: 239–241) refers to his own position as a 'pragmatic [neo]-Kantianism', accord-

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[9] This is not to suggest that Mattessich is unfamiliar with Thomas's work. However, in private correspondence (Mattessich 1998) he has stated that he regards the 'allocation problem' as discussed by Thomas to be 'a measurement (hence epistemological and methodological) issue, not an ontological one'. Yet, Thomas's reference to the results of allocations being 'the furniture of accountants' minds' clearly makes an ontological point.

[10] Various writers, including Ijiri (1975, ch.4) and Sunder (1997, ch.10) have pointed out that 'income' can be considered as a change in physical resources, including monetary tokens. Sunder (loc. cit.) follows Ijiri in presenting accounting rules as mappings of non-monetary resources into monetary ones, and it might seem from this that income does have a referent which is objectively real (i.e. the set of changes in the firm's vector of physical resources). According to this view, intersubjectivity enters into the picture with the creation of the accounting rules or mappings. One problem with this view is that the firm itself is an intersubjective construct or 'institutional fact', i.e. part of social reality (Searle, 1995); hence, its income even when considered as a change in a vector of physical resources is also an institutional fact. See also the discussion in Section 4.1. below.

ing to which 'minds start communicating by means of language....[T]hey are minds in and as part of nature. They cognize after their own kind, and saliences in their world are saliences for *them*. So too does reference (to macroscopic objects) in their language remain a notion tinged with a species-specific intentionality.'

Thus, for neo-Kantians such as Putnam and Tennant this analysis applies to physical as well as social reality. However, this 'anti-realism' needs to be understood as semantic rather than ontological.[11] In other words, key issues in contemporary analytical philosophy are concerned with: (a) how statements have meaning, how knowledge of meaning is achieved and evidenced, and how statements may be established as true (or how warrants for their assertion may be established); rather than (b) the existence of that to which statements refer, if they refer. As Tennant (1987: 11–12) put it, referring to the work of Dummett (e.g. Dummett, 1978, 1984): 'For Dummett,...the substantive issue lies now with the nature of truth-determination. Insofar as *existence* of entities is concerned, ontological hagglers are invited to address themselves to a new type of question. Insofar as the old realist questions of existence had any residual value, they would be cashed in terms of that in virtue of which statements are true, when they are true.'

Mattessich's 'onion model' is a response produced within an ontological debate in which the 'semantic turn' in analytical philosophy had not been taken on board. It might be interpreted as allowing for an external realist view of physical reality, together with an internal realist view of social reality. However, Mattessich's ontological position is closer to that of Searle (1995) who presents himself as a thoroughgoing external realist.[12]

Having agreed in the previous section with Mattessich's refutation of the claims by Heath and Sterling that accounting statements under existing accounting practices are empirically empty, it may seem pedantic ('ontological haggling') to pursue

the question of the sense in which the institutional facts which accounting may represent are real (e.g. internal versus external realism). But, as Tennant suggests, the semantic question of 'that in virtue of which accounting statements are true, when they are true' may turn out to be the crucial one.

In chapter 7, Mattessich quotes Bunge's (1978) criticism of Stegmüller's (1976) philosophy of science, including the following: '[T]he logical [i.e. structuralist] concept of a [theoretical] model must be sharply distinguished from the epistemological [i.e. realist] concept of a model as a conceptual representation of concrete things of a narrow kind. But, whether logical or epistemological, all such models are conceptual: real things are not models of anything, but instead the objects of modelling.' (Mattessich, 1995: 135).[13] Yet it is not clear whether he is citing Bunge in order to agree with him, or rather to illustrate the debate between 'realists' such as Bunge (1983) and 'structuralists' or 'model theorists' such as Stegmüller, whose positions he attempts to reconcile.

Mattessich's 'bridge between structuralism and realism' (pp. 130–132), as illustrated in his Figure 7.1., contains a theoretical model on the left linked to 'a segment of reality' on the right. The latter contains 'observational entities' (phenomena) that are the intended applications of the empirical statements of the theory and are part of an 'observational fragment of reality'. This 'observational fragment of reality' and the 'observational entities' within it are linked to corresponding elements in a 'non-observational plane'. These elements are 'not only factual; they are also *potentially* factual and contain non-observable or not-yet-observable events that might (but need not) correspond...to the theoretical terms [of the theoretical model].....[T]he distinction between conceptual structures on the left-hand side and the real structures on the right...confirms the major realist task of theory, namely to create conceptual forms that represent, as truthfully as possible or necessary, structures inherent in a segment of reality'.
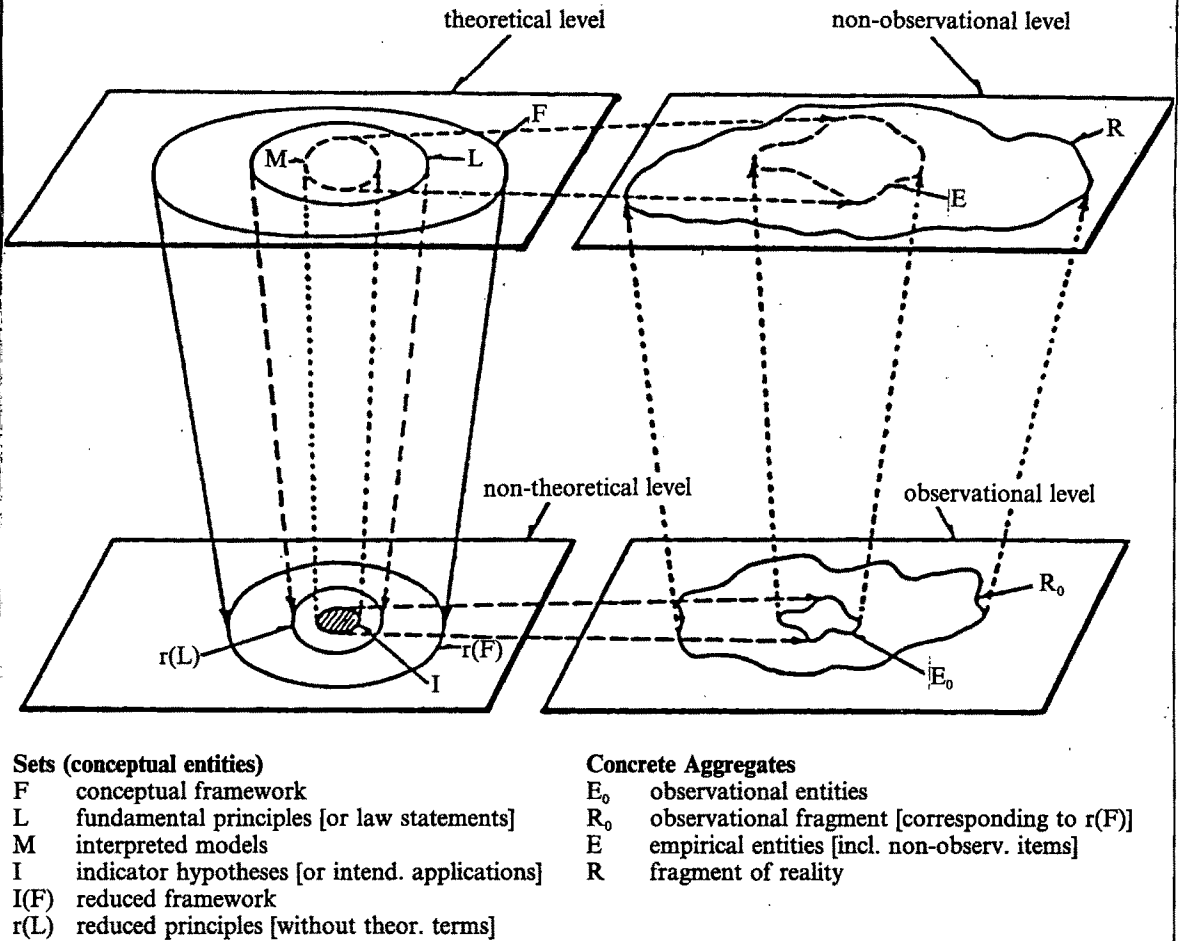
When applied to accounting, 'the non-theoretical level is stripped of the pure concepts but holds economic transactions and evaluations as well as other variables that correspond directly to the real manifestations mentioned [next]. The observational level...presents physical, social and other realities, for example, actual inventories, equipment, buildings, debts...,ownership claims,

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[11] The semantic anti-realist is characterised by *refusal* to accept the following *determinacy thesis*: 'The reality which scientific theories describe and the semantic content of the statements of such theories, are such as to make the latter determinably true or false about the former, independently of our thoughts or means of coming to know what their truth values are' (Tennant, 1987: 10).

[12] Searle (1995 chs. 7 and 8) presents what he describes as an argument in favour of External Realism (ER). However, for him, ER is a purely ontological thesis and is not concerned with the epistemological issues relating to our understanding of reality (op. cit.: 154). In this, he seems to be on common ground with semantic anti-realists such as Tennant, except that he is apparently not averse to 'ontological haggling'. His argument (ch.8), that external reality is a *background presupposition* of our experiences, is quite similar to that proposed by Kant, which, however, he appears to reject. Finally, Searle's argument for ER in these chapters is couched in terms of physical reality ('brute facts') and does not include social reality ('institutional facts').

[13] Bunge's views may be contrasted with those of other philosophers of science, such as Ravetz (1971), who described 'the peculiar character of the activity of science as a special sort of craft work operating on intellectually constructed objects' (Ravetz, 1971: 146). Ravetz also states that 'the judgement of what is a real fact must be a social one, subject to the same sorts of influences, and subject to the same sorts of errors, as other judgements....' (op. cit.: 186).

Figure 1
Correspondence between theory and reality

Sets (conceptual entities)
F   conceptual framework
L   fundamental principles [or law statements]
M   interpreted models
I   indicator hypotheses [or intend. applications]
I(F) reduced framework
r(L) reduced principles [without theor. terms]

Concrete Aggregates
E_0 observational entities
R_0 observational fragment [corresponding to r(F)]
E   empirical entities [incl. non-observ. items]
R   fragment of reality

Source: Mattessich (1995b) Figure 7.1.

transfers of commodities, and their exchange values. The non-observational level could contain cash flows still to occur and other future events (not to be confused with an actual expectation, which is a present mental state and thus found on the [observational] level)'.

However, this explanation of the 'non-observational level' of accounting just in terms of 'future events' is hardly very satisfactory. Where are the 'factual', as opposed to the merely 'potentially factual', elements? These all seem to be located at the observational level. One might perhaps suggest that the 'non-observational level' could include *constructions* placed on what is observed, e.g. financial statements. But do not such constructions need to be mediated by the theoretical concepts which are on the left-hand side of the model? That is, do they not belong to what Mattessich terms the non-theoretical level in the left-hand side of his

model? In short, it is far from clear how Mattessich's 'bridge between structuralism and realism' applies to accounting.

In private correspondence (Mattessich, 1998), Mattessich has offered the following clarification. 'For me, this expression ['potentially factual'] includes the following: (i) facts that actually occur in the future but which are unknown or even unknowable at present; (ii) future facts which at present seem unlikely to occur; (iii) future facts that...seem likely at present; (iv) highly unlikely expectations (at present) that do not materialize as future facts; and finally (v) likely expectations that likewise do not materialize as future facts. The last two items (iv and v) are excluded from the non-observational level by the sentence 'future events (not to be confused with an actual expectation, which is a present mental state...).'

The notion of 'future facts' used by Mattessich here indicates that, as well as perhaps being an (external) realist in Searle's ontological sense, he is a realist in Dummett's semantic sense:

> 'The fundamental tenet of realism is that any sentence on which a fully specific sense has been conferred has a determinate truth-value independently of our actual capacity to decide what that truth-value is.....[F]or our language, in general, containing as it does so many sentences whose truth-value we have no means of deciding, the possession of a truth-value is, on a realist perspective, divorced from our actual means of recognising truth-value....[P]recisely because a realist theory forces so large a gap between what makes a statement true and that on the basis of which we are able to recognize it as true, the theory has difficulty in explaining how we derive our grasp of the latter from a knowledge of the former.' (Dummett, 1973, 1981; quoted by Tennant, 1997: 177–8)

With regard to accounting statements, Mattessich's references to 'future facts' raise the semantic problem indicated by Dummett. This, in turn, raises what is surely a key issue, of how we can recognise accounting statements (i.e. financial reports) as *true*, when they are true.

Another difficulty stems from Mattessich's failure to follow his refutation of the positivistic external realist critique of accounting concepts to its logical conclusion. In the first sentence of chapter 7, Mattessich refers to 'the demise of positivism', which would seem to place him firmly among the post-positivists.[14] Yet at times the implications of post-positivism for social science in general, and for the concept of 'social reality' in particular, seem to have eluded him. The problematic notion of 'social reality' and its implications for accounting require more elucidation than is afforded by Mattessich with his 'onion model'. Of particular relevance is the problem of reflexivity already mentioned in Section 3, but there is the more general problem of indeterminacy discussed in subsection 5.3. below.

Giddens (1981) notes that, in sociological theory, there has been a problem in linking concepts of social reality at the micro (situational) level and the macro (societal or institutional) level. He proposes to overcome this problem by means of his concept of *duality of structure* in social systems. Consisting of the rules and behavioural resources instantiated in social systems, structures in this sense are drawn upon by actors in social life, so that their behaviour is 'structured' by these rules

and resources. Thus, on the one hand, the macro level rules and resources 'structure' actions at the micro level. On the other hand, such micro level actions continually 'structure' (i.e. instantiate and reproduce) the social systems at the macro level (in ways that have unintended as well as intended consequences).

This analysis of social reality from the perspective of sociological theory has implications for philosophy and for accounting. In fact, the analysis supports the position of the semantic anti-realists. Social systems do not exist independently of human agency (and hence of mind and representations), for while both enabling and constraining actions, they are instantiated and reproduced by them. One might be tempted to say that they are thus 'real' in the sense of Internal Realism, rather than External Realism. However, to avoid 'ontological haggling', one may rather say (to use Tennant's words) that attention should be turned to 'that in virtue of which statements [about social reality] are true, when they are true'.

'Economic reality' is an ill-defined notion in the accounting literature generally, but in terms of Mattessich's (or Searle's) model it is clearly some aspect of a social system, as discussed above. Mattessich's onion model and Searle's theory of institutional facts, however, have difficulties with the reflexive nature of the relationship between accounting and its social environment, and with the question of that in virtue of which accounting statements are true, when they are true.

It is common ground that there are, for example, numerous bases for valuing assets, and that the acceptability of a particular basis in the preparation of financial statements is a matter of social convention (that is, of 'generally accepted accounting principles') which may or may not be enshrined in law. Likewise, there are different bases for the recognition of revenues and expenses in calculating profit, the acceptability of which is governed by similar social conventions or rules.

This implies a negative answer to the question of whether, when one refers, for example, to 'inflating' profits, there is some 'true' figure by reference to which one could judge that the reported figure is inflated. Rather, what is implied is that the reported figure results from a gross (upward) bias in the application of the relevant accounting conventions or rules. These rules could be applied to produce a range of different profit figures; but the 'inflated' profit results from an application of the rules deliberately and opportunistically designed to produce a figure which is so far towards the upper extreme of that range as to be *false* in the sense of being *misleading*. This implies that the 'creative accountant' thinks of the reported figure being used for a purpose, and seeks to influence that use by manipulating the perceptions of the user.

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[14] It is odd that in accounting, as in economics, positivism has remained in fashion decades after its demise in mainstream philosophy.

The way in which actions reproduce social systems but may have unintended consequences, as well as the fact that such reproduction is not homologous (Giddens, 1981: 172), can be seen from the way accounting standards bodies tend to react to egregious instances of creative accounting by modifying the rules so as to 'close the loopholes'. In other words, 'creative compliance', rather than just instantiating and reproducing the accounting rules being complied with (as normal compliance does), may lead to a *modification* of the rules.

Net income, owners' equity and related concepts may be considered to have real-world referents in the sense that their calculation, reporting, use in decision-making, etc., instantiate and reproduce aspects of a social system (social reality) in which, by virtue of reflexivity, they also have real economic consequences. As Ijiri (1975 ch. 1) points out in the case of net income, it is not so much that the accounting measure is a surrogate measure for some unobservable (but nonetheless real) principal; instead, it is treated as a principal in itself.

To use Searle's (1995) terminology, under appropriate conditions a firm's profit becomes (is objectified as) an 'institutional fact'. But that does not mean that profit is real, or has a real-world referent, in the realist sense of existing independently of the collective representations which lead under appropriate conditions to its objectification. Moreover, once this is recognised, the issue of reflexivity (that accounting crucially affects these representations and hence social reality, as well as vice versa), points to the shortcomings of realism.

In chapter 11, Mattessich acknowledges that accountants both represent and create reality: '[T]here is no reason to deny that accountants create new realities nor that they try to represent them; the two are not [mutually] exclusive. However, it is crucial to distinguish that segment of reality which serves as a tool of representation from the one that is the object of cognition and representation'.

But this 'crucial' distinction raises the issue of how the reflexive relationship between accounting and what it represents is to be accommodated. Mattessich does not analyse, and consider the implications of, the process of intersubjective construction and reproduction of the social reality as represented by the accountant, whereby that reality *in turn takes shape* from the accountant's representations insofar as they form the basis for *collective* representations (Hines, 1988; Ijiri, 1975: 188–9)). At times, it seems that what Mattessich means by 'accountants creating reality' is merely that they create artefacts (themselves real objects) to represent reality. While he might claim that his Conditional-Normative Accounting Theory (CoNAT), presented in chapter 11 (Mattessich, op.

cit.: 204–207) means more than that, it is unclear what the meaning is. There is no reference to the issues of reflexivity and intersubjectivity (as outlined above) in his exposition of CoNAT.[15] CoNAT and CoNAM are discussed further in Section 5 below.

It seems to me, therefore, that Mattessich's epistemological analysis in his chapter 7, as well as his ontological analysis in chapter 3, fail to deal adequately with these issues. Perhaps this is because, as his chapter 11 seems to confirm, he sees the issues as primarily methodological (i.e. concerned with measurement) rather than more fundamentally semantic (i.e. concerned with how accounting statements can have truth-values and be recognised as true—that is, not misleading—or false).

Mattessich's insistence on the crucial role of the 'required information purpose' in accounting, as already noted in subsection 2.5. above, is highly pertinent to the issue of whether accounting statements mislead, and if so, how. Yet surely this is not just (or even primarily) a methodological issue. Rather, the issue of that in virtue of which accounting statements (financial reports) are true or false, and the basis on which they can be recognised to be so, is a more fundamental semantic issue, and one which involves the reflexive relationship between accounting and its environment. Mattessich's brief acknowledgement of that relationship does not lead him to examine seriously whether a realist position on these issues is tenable.

4.2. Mattessich's Critique of Positive Accounting Theory (PAT)

According to Mattessich (1995b: 161–2), '[t]he scientific and philosophic meaning of *positive* implies a theory free from value-judgements (except for "pre-scientific" ones, necessary for scientific research in general). In other words, a pure science cannot accept value judgements as premises but can only encapsulate them in observed facts.

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[15] In his chapter 11 (Mattessich, 1995b: 204–207) distinguishes between 'positive' [i.e. scientifically rigorous] and 'pragmatic' conceptual representations, and comments: '[P]ragmatic representation...[by] the keeping of accounts and the construction of financial statements...in contrast to the positive one, does not aim at an objective and all-illuminating picture. It is satisfied with shedding light only on certain facts....That is the very reason why we need different accounting models for different purposes, why we must illuminate 'our' reality from many sides. Through such a variety of viewpoints, we may reveal more of this segment [of reality] than a positive representation could ever do.' This suggests that the positive representation corresponds to what Ijiri (1975 ch. 1) terms the principal, for which the pragmatic representation is a surrogate; but, as Ijiri notes, in accounting the surrogate (such as net inome) may be accorded the status of a principal in its own right, i.e. it is not treated just as a representation of something else. Thus, accounting does not just illuminate 'our' reality; it is involved in *constructing* it.

Means-end relations are thus automatically excluded from the theory itself, since the goal or "end" is a value-laden premise for determining the means.' The problem he sees with positivism in accounting research is that it 'predisposes academic accountants to think in terms of positive hypotheses (cause-and-effect relations) instead of instrumental hypotheses (means-end relations), often without awareness of the logical gap and other differences between them (although presumed *truth* is important for both types of hypotheses, presumed *usefulness* is a further ingredient of instrumental hypotheses).' Thus, his critique of PAT does not reflect *epistemological* reservations about positivism in general, but objections which he puts forward as being of a *methodological* nature.[16] Mattessich sums up the characteristic methodological tenets of PAT, based on his analysis of the writings of Watts and Zimmerman, as follows (pp. 165–169).

• Accounting theory should not be concerned with prescription but only with explanation and prediction because prescriptive (i.e., normative) theories are unscientific.

• Chicago-based neo-classical economics is the major foundation for accounting.

• Predictions are emphasised (unduly) as the fundamental goal of accounting theory.

• Methodological disputes are regarded as fruitless.

• Reliance is placed predominantly on statistical procedures to test hypotheses.

• Value judgments are to be excluded from the premises of PAT and means-end relations are disregarded.

• The attempt is made to turn accounting into a positive science.

In my view, this summary does not quite capture the essence of PAT and its relationship to the 'empirical turn' in accounting research begun by Benston (1967), Ball and Brown (1968) and Beaver (1968).[17] Historically, positivism has been the

response of a scientific community to external values in the host society which are perceived as inimical to its project (Ravetz, 1971, ch. 5). In the case of PAT, it seems that the external values in question were those of the professional accounting environment and its approach to producing justifications for accounting rules (Watts and Zimmerman, 1979).

In other words, in the historical context the 'empirical turn' represented a departure from (and a reaction against) the practice of attempting to derive prescriptions for 'good' or 'correct' accounting methods from the assumptions of the normative accounting theory (NAT) prevailing in the 1950s and 1960s. This reaction stands in stark contrast to the Financial Accounting Standards Board's massive attempt, over the years 1974–1985, to develop a 'conceptual framework' of NAT.

A just appraisal of PAT thus requires recognition of the deficiencies of NAT and the nature of the 'empirical turn' in relation to these. The deficiencies of NAT may be summed up as a lack of empirical grounding, wilful neglect of economic consequences, and a reliance upon *a priori* reasoning to justify prescriptions (Archer, 1993, 1997).

As to the first point in Mattessich's summary, NAT is dismissed as unscientific by positive accounting theorists; not just because of being normative or prescriptive, but because it was putting forward prescriptions based on a set of assumptions about 'the nature of accounting, its role, the effects of different procedures on stock prices, and so on [as though they] were self-evident...[and] very little concern was exhibited for [their] empirical validity' (Watts and Zimmerman, 1986: 4–5).[18]

Moreover, the normativity of NAT is not simply prescriptivity. As Mattessich notes in chapter 11, NAT does not place its prescriptions within a framework of means-end relationships in which the means prescribed are related to, and conditional upon, the ends pursued. Thus, the value-judgments behind the prescriptions are left latent.[19]

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[16] With regard to positivism in science generally, Ravetz (1971: 160–4) notes: 'The exclusion of problems of value from the traditional philosophy of science has its roots in the ideology of modern natural science as it was formed through many generations of struggle.
'... When a field is still in the process of being created, purely technical studies need to be supplemented ... by philosophical inquires on the one hand, and by the solution of practical problems of organization and support on the other. For when a field is too immature to yield facts from its investigations, nothing is more futile than the attempt to amass "positive" knowledge in the absence of any reflection on the nature of its objects or on the methods of its achievement.' See also Putnam (1981 ch. 6).

[17] Mattessich (1995b: 162) states that 'to identify PAT... with empirical research in accounting in general, is like asserting that every bird is a sparrow'. Of course, empirical research in accounting is not necessarily positivistic, but historically speaking, Mattessich's statement is true of the research carried out following the 'empirical turn' in the late 1960s only if one ac-

cepts a narrow definition of PAT that conforms to all seven points listed in Mattessich's summary. The research in question during the 1970s and early 1980s was positivist insofar as it largely conformed to his first, fifth and sixth points, and (in financial accounting as opposed to management accounting or auditing) to his second point.

[18] Mattessich refers in ch. 4 to 'terminological and conceptual difficulties' in NAT, including the following: 'General concepts require specific and, in many cases, empirical interpretations. In accounting, unfortunately, the distinction between interpreted and uninterpreted concepts is even more neglected than that between defined and undefined terms. Concepts like income, wealth and value, for example, are treated as though they were well interpreted concepts; but, at best, an interpretation is merely implied.' (pp. 68–70)

[19] C.f. Mattessich's remark in ch. 9, quoted in subsection 2.8. that 'at least to some extent, the "accounting crisis" is rooted in frequent attempts to conceal the true objectives pursued.'

By contrast, and with reference to Mattessich's second point, PAT in a broad sense consists of theories from social and behavioural science (and not just Chicago-style neoclassical economics) which seek to explain and predict significant phenomena associated with accounting. They are potentially the means whereby knowledge of the means-end relationships, on which Mattessich places such emphasis, may be established. As Mattessich notes (pp. 165–6), Watts and Zimmerman (1990) recognise the potentially 'normative' implications of 'positive' theories. For his part, Mattessich (as noted above) seems to consider what he calls pure 'mother' disciplines, such as economics and the behavioural sciences, as 'positive' or value-free.

Mattessich's third point—the emphasis on prediction as the fundamental goal of accounting theory, at the expense of explanation—is not an inherent feature of PAT, as a reading of the chapter on 'The Role of Accounting Theory' in Watts and Zimmerman (1986) will confirm.

Mattessich's seventh statement, that PAT 'tries to make a positive science out of accounting' would be better expressed, as Mattessich does in chapter 11, by saying that W&Z fail to acknowledge the need for research in accounting of the 'applied' as well as the 'pure' type.[20] Mattessich's references to 'applied research' emphasise that aspect of accounting which he sees as being analogous to applied sciences such as engineering or medicine. Yet, such analogies between the natural sciences and their applications in technology, and the social and behavioural science and their applications to social issues, are problematic (Archer, 1993: 118; Whitley, 1988). Further discussion of this problem will, however, have to wait until Section 5.

Finally, and crucially, what does Mattessich's critique of PAT tell us about his own epistemological and methodological positions? First, he does not seek to criticise PAT from a non-positivist epistemological standpoint, and this limits the thrust of his criticism.[21] Second, his criticism of W&Z from a methodological perspective misses the key point that they are guilty of 'scientism', i.e. they believe that there is a 'methodology of economics, finance and *science generally*' (Watts and

Zimmerman, 1990 quoted by Mattessich, 1995: 168; my emphasis). This statement by W&Z indicates ignorance of the fact that each field of scientific endeavour develops its own criteria of adequacy (Ravetz, 1971 ch. 5). Yet Mattessich himself states that the view of methodology expressed in the quotation 'may be correct, but only if one excludes the applied sciences from "science" ' (Mattessich, 1995b: 168).

This point merits particular attention, as it epitomises the limitations of Mattessich's methodological critique of PAT. Ravetz (1971 ch. 5) offers a characteristically subtle and deep analysis of the issue of value-judgments in science which is helpful here, and some extracts are worth quoting.

'We can distinguish three independent components in [the] criteria...of value applied in judgements on scientific problems and results ...,two relating to the functions of the completed piece of work, and the other to the purpose of the scientist in undertaking it. Of [the first two] "objective" components, the first is the "internal" one: to what extent the solved problem will, or does, advance knowledge of the objects of inquiry of the field...; this is the dominant criterion of value in "pure" science; and we note that it is the least amenable to precise estimation....The criteria of "internal" value adopted for a field will depend on both the social experience of what has been successful in the past, and also on the general conception of where the field is, or should be, heading at [this] point of its development....Parallel to this is the [second] "external" component of value: the contribution that the completed project makes to the solution of problems, or the accomplishment of tasks, outside the given field....In the ideology of science which became dominant towards the end of the last century, any form of external component of value was considered as a falling away from...the...ideal of "pure science". ...Even though I am not directly attacking [the positivist dichotomy between objective scientific facts and subjective value-judgments] here, I am...arguing that complex judgements of value which are in principle highly fallible condition, or even determine, the selection of those facts that actually come to be. To protect the world of scientific fact from this invasion of judgements of value, one might hope for an application of "scientific method" itself....Such a hope is vain, and a policy based on it would be disastrous. ....[T]here is no simple and automatic recipe for the production of factual scientific knowledge....' (Ravetz, 1971: 162–7)

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[20] See the quotation from Milburn (1994) in Mattessich (1995b: 191).

[21] According to Mattessich (1998), W&Z use the term 'positive' in the same sense as he does, i.e. to mean 'pure' as opposed to 'applied'. He states that he therefore does not consider them as 'positivists' in the sense of believing in the fact-value dichotomy, and holding that scientific knowledge is 'positive' in the sense of being value-free. But he also associates them with the view that '[a]ccounting theory should not be concerned with prescription but only with explanation and prediction because prescriptive (i.e. normative) theories are unscientific'. (Mattessich, 1995b: 165). That view seems to be altogether 'positivist' in the above sense.

5. Conditional-normative accounting methodology

5.1. Introduction

The process of intellectual inquiry that led to CoNAM started with Mattessich's early essays in the axiomatisation of accounting theory (e.g. Mattessich, 1957), was manifest in the theoretical structure proposed in *Accounting and Analytical Methods* (*AAM*, Mattessich, 1964 ch. 2), and underwent a crucial development when Mattessich produced the revised, German-language version of *AAM*, *Die Wissenschaftlichen Grundlagen des Rechnungswesens* (The Scientific Foundations of Accounting; Mattessich, 1970). As indicated in subsection 2.5. above, and explained in Mattessich's award-winning paper 'Methodological preconditions and problems of a general theory of accounting' (Mattessich, 1972), this was the inclusion of a further assumption or assumption-schema in his theoretical structure to the effect that 'there is some specific purpose and information objective to be attained by a particular accounting system'.[22]

Typically, the purpose and information objective will not be those of the accounting researcher or systems designer; instead, they are attributable to the actual or potential users of the theory or system. But Mattessich insists that the assumption of a specific purpose is crucial to the theoretical structure within which the researcher works.

As noted in subsection 2.5. above, the problems associated with the attempt to develop a conceptual framework for 'general purpose financial statements' provide evidence that Mattessich is correct. We can also see that, in developing CoNAM, Mattessich has remained true to his original training as an engineer.[23] Engineers design artefacts to meet specific objectives; depending on their specialism, these artefacts may be items (to name but a few) such as bridges, or mechanical devices, or information (IT) systems. Why shouldn't accountants do the same?

Why indeed? I would suggest that there are two essential reasons, which interact to reinforce each other:

1. Lack of consensus over the system's objectives. Typically, the design of an accounting system is the subject of at least partly conflicting objectives between the providers of information (accountors) and the receivers of it (accountees), since a major function of the accounting system is to enable the latter to exercise some degree of control over the former (Ijiri, 1975 ch. 3).

2. Deficiency of knowledge of means-end relations. Even when there is consensus over objectives or ends, there is no scientific corpus of knowledge (of lawlike empirical generalisations) regarding means-end relations which would enable the accountant to design an appropriate system and to demonstrate it to be so; hence the system's adequacy is likely to remain a matter of conjecture or controversy.

It seems to me that CoNAM pays insufficient attention to these interlocking problems. The difficulties encountered in applying the 'means-end schema' or 'hard systems approach' in financial accounting have been analysed elsewhere (Gerboth, 1973; Archer, 1993). Moreover, the very notion of 'conditional normativity (or prescriptivity)' may be problematic. These issues are discussed below.

5.2. The problem of objectives and related value-judgments

Let us consider the third and subjective component identified by Ravetz (1971 ch. 5; see the quotation in subsection 4.2. above): the researcher's own purposes and associated value-judgments. In this regard, CoNAM implies the position that the task of the accountant is to design means helpful for achieving various ends (technical solutions to various accounting problems), and it is up to the interested parties to reach consensus regarding the ends to be aimed at (c.f. Mattessich, 1995b ch. 6). But this type of 'conditionally normative' approach avoids explicitly addressing the issues raised by the entire field of scientific, technological and professional ethics. To what extent can the designer of means be disengaged from the value-judgments regarding the ends for which the means may be used?[24] The brilliant physicists whose work provided the basis for the production of nuclear weapons, learned the dangers of such disengagement when it was too late, and to their bitter regret. No doubt what is at stake in the case of accounting is of a far more modest nature, but it nevertheless merits consideration.

Mattessich is familiar with the work of what he calls the 'critical-interpretive' school of accounting theorists (Mattessich, 1995b ch. 10), and he asks for CoNAM to be accepted as a 'synthesis' between the 'critical-interpretive school' and PAT.

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[22] Mattessich's thinking about these matters developed further when he wrote *Instrumental Reasoning and Systems Methodology* (Mattessich, 1978). However, the first publication in which he uses the term Conditional-Normative Accounting Methodology appears to be the much later paper in *Accounting Organizations and Society* (Mattessich, 1995a).

[23] For Mattessich's early training as a mechanical engineer, and subsequent study of economics, see Mattessich (1995c ch. 1). Mattessich refers with apparent approval to a quotation from Milburn (1994: 19) which urges that accounting researchers should see themselves more as a species of 'social engineers' and less as social scientists (Mattessich, 1995b: 183 and 191). However, for reasons discussed in the text, the concept of 'social engineer' is problematic.

[24] Mattessich (1998) strongly denies that CoNAM ignores the entire field of scientific, technological and professional ethics, and I certainly would not wish to imply that these issues are unimportant for him. But his formulation of CoNAM is not such as to make their relevance explicit.

However, in my opinion CoNAM hardly constitutes such a synthesis; and indeed I wonder whether any such synthesis is feasible, for it would involve reconciling what appear to be incompatible epistemological positions. For example, Mattessich has not effectively taken on board the strictures of the critical and the interpretive theorists regarding positivism (the claim or aspiration to value-freedom) in accounting research. CoNAM deals with the issue of value-judgments only in general terms. But can the accounting researcher put forward suggested means for achieving particular ends, while avoiding any value-judgment regarding those ends or other consequences (such as side-effects) of the means being employed? How does CoNAM deal with this?

If any such synthesis is feasible, I believe that to achieve it Mattessich would also need to make the role played by accounting, in not only representing but also constructing and reproducing social reality, explicit in the formulation of CoNAM or its successor.

5.3. The problem of knowledge of means-end relations

Mattessich seems aware of the deficiencies in the knowledge of means-end relations relevant to the formulation of accounting prescriptions or norms. As noted in subsection 2.4. above, he refers in chapter 4 to the need for accountants to do 'what chemists did before the periodic table could be explained in terms of sub-atomic particles. They must construct self-contained theories on the basis of what they know'.

I wonder, however, whether 19th century chemistry, with its many scientific and technological achievements, is not rather a flattering analogy for accounting, or for the social and behavioural sciences to which accounting must look for its scientific basis. A more illuminating analogy might be chemistry as it was in Isaac Newton's time, before the beginnings of modern physical chemistry emerged in the late 18th and early 19th centuries with Antoine-Laurent Lavoisier's discovery of the elements and John Dalton's development of the atomic theory.

Prior to these gigantic advances in chemistry, the project of Alchemy, namely to derive gold from base metal, did not seem vain or absurd; alchemical research was deemed fit for the greatest intellects. Is it not a sobering irony that Newton, who must rank among the greatest scientific geniuses in human history, spent much of the latter part of his life on alchemy, an enterprise not just scientifically impossible and a complete waste of time (although he could not know that) but also, because it involved the use of mercury, potentially damaging to his health?

Thus, one major problem of a deficiency of knowledge may be an inability, not just to solve problems, but even to recognise 'problems' that have no hope of being solved, except perhaps in some cases by pseudo-solutions at the level of 'folk-science'. As Ravetz (1971: 366–7) put it: '[T]he difficulties of working in an immature or ineffective field are serious and manifold....The situation becomes worse when [the] field is enlisted in the work of resolution of some practical problem. In such an [epistemologically] uncontrolled and perhaps uncontrollable context, where [scientific] facts are few and political passions many, the relevant immature field functions to a great extent as a "folk-science". This is a body of accepted knowledge whose function is not to provide the basis for further advance, but to offer comfort and reassurance to some body of believers. ... [R]eally complicated situations...arise when [the relations of such immature or ineffectual disciplines with their social environment] are developed in connection with technical and practical problems, and also entangled with ideologically-sensitive folk-sciences'.

It is in this type of scenario, for example, that a 'market for excuses' as hypothesised by Watts and Zimmerman (1979) in the case of accounting, might be expected to flourish.[25] As Ravetz (1971: 399) warns: 'When an immature field takes on the task of expanding its research effort for the solution of some urgent practical problem, there will be a tendency for the outcome of its labours to be a weighty argument establishing the conclusions that its sponsors wanted all along.'

There are, therefore, dangers if accountants try simply to 'do what chemists did' before chemistry had developed a theoretical structure of its own, appropriate to its scientific objects. They may find themselves trying to solve 'problems', the very posing of which reflects the ineffectualness of the discipline, and which have no hope of solution other than tendentiously in terms of 'folk-science' or even 'excuses'. Many of the problems raised in connection with issues of accounting standard-setting, especially those concerned with issues of accounting 'measurement', need to be critically examined from this epistemological perspective. It is surely no answer merely to cite, as Mattessich does, the 'pragmatic' nature of accounting measurement.

This is not to deny that, in considering accounting standard-setting as being concerned with the

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[25] Unfortunately, W&Z did not demonstrate much knowledge of epistemology (or of philosophy in general) when developing their hypothesis of a 'market for excuses'; see Christenson (1983). Nevertheless, while their characterisation and explanation of the phenomenon may leave much to be desired (see Peasnell and Williams, 1986), W&Z were surely correct in drawing attention to the epistemological problems of Normative Accounting Theory.

Table 1
Example of a simplified instrumental hypothesis

1,	Minority shareholder's objective	To maintain a moderate standard of living (through regular dividends) without eroding his investment in Company X.
2.	Empirical relationship	Maintenance of a moderate living standard is (under given circumstances) likely to be attained by maintaining 'financial capital.'
3.	Analytical relationship	Maintaining 'financial capital' implies measuring income adjusted for general inflation only.
4.	Inductive inference	Measure income on the basis of general inflation adjustment.

Source: Mattessich (1995b)

articulation and implementation of a set of rules, there are perfectly valid issues concerning the internal consistency and coherence of that set of rules. The problem arises when one seeks to justify the imposition of the rules by reference to instrumental hypotheses such as those presupposed by CoNAM. In chapter 6, Mattessich makes some attempt to show how this may be done, so far as models of valuation and of capital maintenance are concerned. An example of a 'simplified instrumental hypothesis' is given in his Table 6.8., which appears as Table 1.

The obviously weak link in this chain of reasoning is in the second premise which expresses an 'empirical relationship': 'Maintenance of a moderate living standard is (under given circumstances) likely to be attained by maintaining "financial capital" '. Of course, this is only a simplified example; but it raises the question of how the existence of a purported empirical relationship or economic consequence of the type depicted by the second premise could be established. At the very least, auxiliary hypotheses would be required concerning both the implications of 'real financial' capital maintenance for the financial management of the firm, and the effects of the implied financial management practices on the wealth of a minority shareholder. The second premise, and the instrumental hypothesis as a whole, would then be no more plausible than the conjunction of the two auxiliary hypotheses.

As I noted in Section 2 above, Mattessich acknowledged in chapter 5 that 'For now, there are no satisfactory answers to [a number of crucial] questions [including]...above all, which [of the different interpretations of value, income, and realization] matches which information purpose. ... The cathartic task of this transition period would lie in converting rules of thumb into well-grounded, objective-oriented hypotheses' (p. 87). His position regarding the feasibility of establish-

ing 'well-grounded hypotheses' in these areas seems to vary between the decidedly cautious and the sanguine.

Consider, for example, Mattessich's reference to 19th century chemistry in the context of the epistemological development of accounting. This suggests that he perceives the latter primarily in terms of the availability of more lawlike empirical generalisations (nomological knowledge), provided by the 'parental' social science disciplines, which can then be incorporated into instrumental hypotheses.[26] But there are reasons for doubting that the main growth of knowledge in the social sciences will be in the nomological form. Post-empiricist philosophers of social science such as Bohman (1991) emphasise the 'problem of indeterminacy', which stems from reflexivity and intentionality. In other words, the phenomena associated with human social systems are subject to the influences of reflexivity (people's ability to reflect upon and to change their own behaviour in ways that tend to disturb empirical regularities) and intentionality (the role of beliefs, hopes, desires and suchlike subjective mental states in bringing about actions), so that prediction is inherently problematic.

This implies that predictive ability as a basis for prescriptions in applied social science is likely to remain epistemologically problematic. Instead, we could hope to develop what might be termed 'critical-explanatory knowledge'. How this compares to a conventional view of the development of empiri-

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[26] Mattessich (1998) states: 'I only used chemistry as a handy illustration with regard to "self-contained theories", and wholeheartedly agree with you that such an analogy with accounting would be by far too flattering....I do not at all believe that accounting can or should establish law-like statements'. The issue, however, is not so much whether Mattessich explicitly holds certain ideas about the epistemological status of accounting, but rather whether his formulation of CoNAM implies such ideas. Because of this, his position appears somewhat equivocal.

Table 2
Roethlisberger's 'Tree of Knowledge'

Levels	Characteristic statements (theories)	Methods	Products
Analytical (scientific) knowledge	General propositions	Creative & inductive leaps of imagination	Deductive systems
	Empirical propositions	Operational definitions rigorous measurement	Statements of the form x varies with y under given conditions
	Elementary concepts	Definitions of concepts & variables Elementary measurement	Statements of the form x varies from y
Clinical knowledge	Conceptual systems	Observations & interviews	Descriptive cases and syndromes
		Classification	Taxonomies
Skill or craft knowledge	Knowledge of acquaintance	Practice and selection	How-to-do-it statements and aphorisms
		The phenomena	

Source: Roethlisberger (1977)

A possible alternative 'Tree of Knowledge' for the social sciences

Levels	Characteristic statements (theories)	Methods	Products
Critical-explanatory knowledge	Macro-micro links	Quasi-experiments	Diagnostic statements
	Manipulanda	Embedded case studies Comparative analysis Triangulation Replication	Statements of the form 'By changing x we can change y'
Clinical knowledge	Conceptual systems	Observation and Interviews Classification	Descriptive cases and syndromes Taxonomies
Skill or craft knowledge	Knowledge of acquaintance	Practice and selection	How-to-do-it statements and aphorisms
		The phenomena	

Source: Archer (1995)

cal science may be seen from Table 2 (see also Archer, 1995).

The upper panel of Table 2 is taken from Roethlisberger (1977), and was apparently developed with the natural sciences in mind, with some medical influence apparent in the terminology (clinical knowledge, syndromes). Foucault's (1969) model of the development of scientific discourses happens to map quite neatly into Roethlisberger's 'Tree'. Foucault posits three 'thresholds'. The first, that of 'epistemologisation', demarcates the discourses of 'clinical' knowledge from those of mere skill or craft knowledge; the second, that of 'scientificity', is crossed in the transition from the discourses of clinical knowledge to those of more formally or analytically-based scientific knowledge; the third, that of 'formalisation', marks the step to a knowledge discourse of a highly mathematicised kind, such as that of contemporary physics.

In contrast, the lower panel of Figure 2 was developed with the social sciences in mind. In the latter, the implications of reflexivity and intention-

ality make problematic the notion of a transition from clinical to scientific knowledge (empirical propositions valued for their generalised predictive ability) across a 'threshold of scientificity'. Instead, we can envisage a different and complementary transition to a different but equally valuable form of knowledge, which I have termed 'critical-explanatory', particularly concerned with diagnosis and change in organisations and society.[27]

Mattessich, when comparing the problems of empirical knowledge in accounting to those in 19th century chemistry, seems at times to misunderstand the former in some important ways. Yet, at other times, Mattessich exhibits just the awareness I am asking for. '[The]...overemphasis on prediction as the fundamental goal of accounting and its theory...seems critical in the face of new insights about the precarious nature of predictions in science in general, [and] in particular, in the biological and social sciences.' (Mattessich, 1995b: 219) Had Mattessich paid more attention to philosophers such as Putnam who are much closer to the social sciences, or Ravetz with his close attention to the social processes of knowledge-production; and had he followed up his criticism of PAT (that it is overly influenced by Chicago-style economics) by exploring alternative social science paradigms such as those of sociology for the insights they could offer us; then I believe a much richer and subtler accounting theory than CoNAM in its current form would have emerged.

6. Concluding remarks

This paper is intended as a review of Mattessich's *Critique of Accounting*, and not as an evaluation of his life's work up to and including its publication. In particular, one of his most interesting works, *IRSM* (Mattessich, 1978), is barely touched on. Nevertheless, a review of *Critique of Accounting* entails a critical examination of Mattessich's positions as an accounting thinker. Enough has been written in the five sections above to make clear his distinctiveness as an accounting theorist, namely his consistent preoccupation with the issues concerning the ontological, epistemological and methodological foundations of accounting, and especially his insistence that accounting is, or should be, an applied (social) science with its prescriptions grounded in propositions of the 'parental' social science disciplines.

In some ways, the empirical turn in accounting research might appear to be an answer to his pleas, but he does not consider this to be the case, and is clearly uneasy with certain aspects of this

empirical turn, as one can observe from his remark that a further 'empirical revolution' will be required if that grounding of accounting prescriptions (or instrumental hypotheses) is to be achieved.

What Mattessich has not identified is the *nature* of that further revolution. Apart from the occasional hint, he has not considered the type of argument which I have cited in the preceding sections, namely that what is required is an epistemological revolution in the thinking of accounting researchers, which might perhaps best be characterised as post-empiricist. Mattessich's unease about current empiricism in accounting research, and call for a further revolution, stop well short of such a move towards post-empiricism. I do not think it is just 'ontological haggling' to remark, as I did in Section 3, that his ontological position leaves a number of important loose ends. More importantly, in his epistemology, although he is critical of positivism in the applied sciences, his position with regard to positivism (i.e. the belief in the fact-value dichotomy and in the value-freedom of scientific knowledge) in general is less clear, for example when he uses the ambiguous term 'positive' to refer to 'pure' (i.e. not applied) sciences, including the social science disciplines which he regards as 'parental' for accounting.[28] Yet, for the reasons discussed in the preceding sections, neither an external realist view of social reality, nor an ambiguous epistemological position regarding the rigid fact-value dichotomy of positivism, seems to be helpful in bringing a *critique of accounting* to full fruition.

Such a reservation appears justified if one accepts Mattessich's own statement (p. 1) that a key aim of such a critique is to examine the relations between accounting and the 'pertinent reality' with which it interacts (notably, social and economic reality). But the fact that Mattessich's deeply thoughtful book brings such questions on to the agenda implies that it is essential reading for all those seriously interested in accounting theory.

[28] Mattessich (1998) makes it clear that he rejects the logical positivism of philosophers such as Carnap (1934) as a general philosophical position. On the specific matter of the fact-value dichotomy, he states his position as follows: 'The [Critical-Interpretive View] seems to belittle the distinction between pre-scientific value judgments and other value judgments, and asserts that all science is value-loaded. [I maintain] this distinction (as a necessary condition for doing science and asserting truth-criteria) but admit that if this (perhaps artificial) distinction is rejected, all sciences must be regarded as value-loaded. ...[I believe] that verification procedures (as auxiliary means) are relative to disciplines and are more or less subjective. They need to be supplemented by a refined principle of refutation....' The reader might wish to compare this statement with the quotations from Ravetz (1971) at the end of subsection 4.1. and in footnote 16 at the beginning of that subsection. While in general it would be unfair to accuse Mattessich of 'scientism' (in fact, I did not do so), in his book he fails to identify 'scientism' as a problem of the Watts and Zimmerman position.

[27] The term 'manipulanda' in Figure 2 refers to 'things that can be altered in order to bring about change elsewhere in the system' (Cook, 1983).

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ERRATUM

Capital gains tax: Implications for the firm's cost of capital, share valuation and investment decision-making

Mike Dempsey

This article appeared in the Spring 1998 issue (Volume 28, No 2) of *Accounting and Business Research*, pp91-96. A typesetting error resulted in the following equation being omitted from p96 in that article.

$$R_a < R^{ret} = R^{new}.q < R_d/(1 - Tg)$$

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